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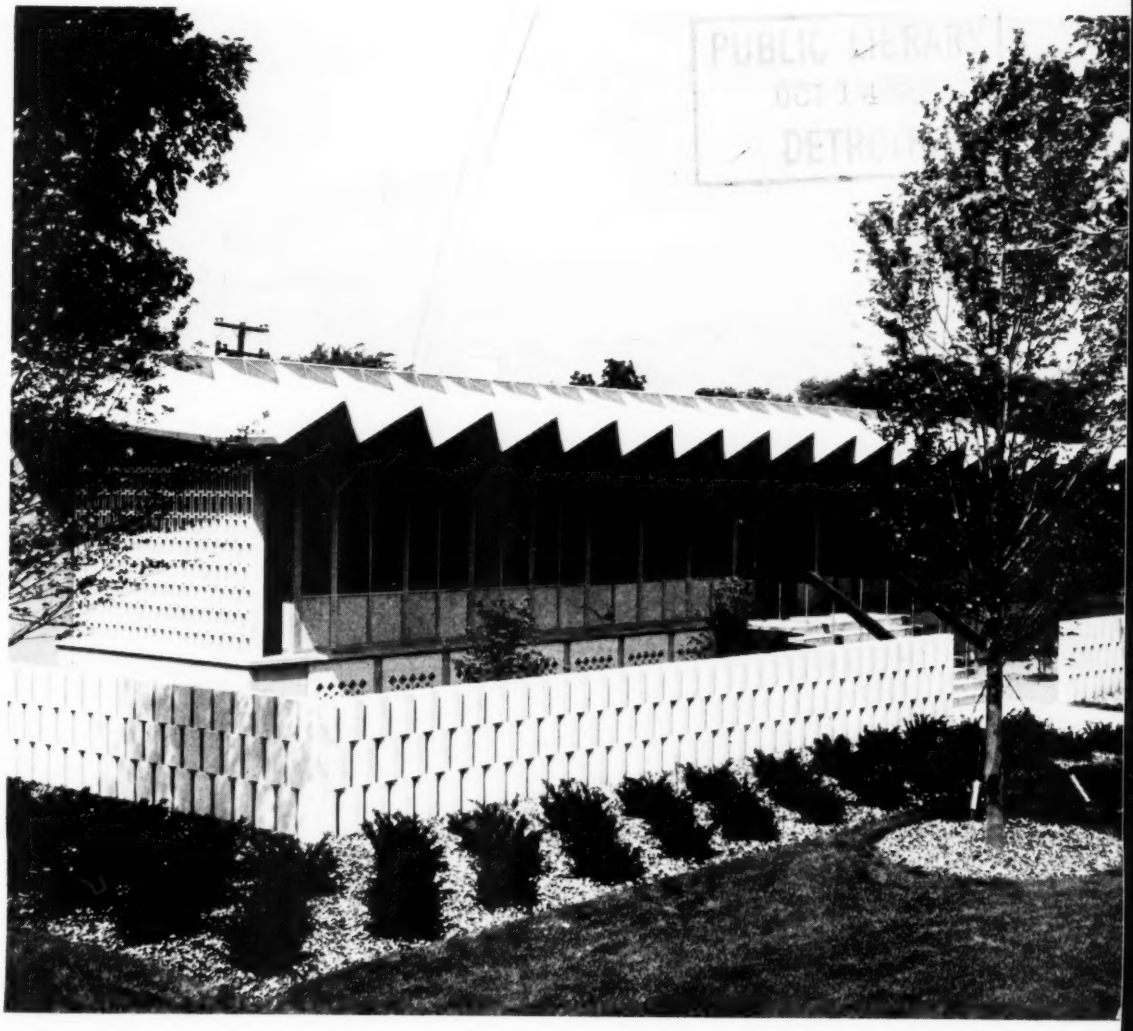

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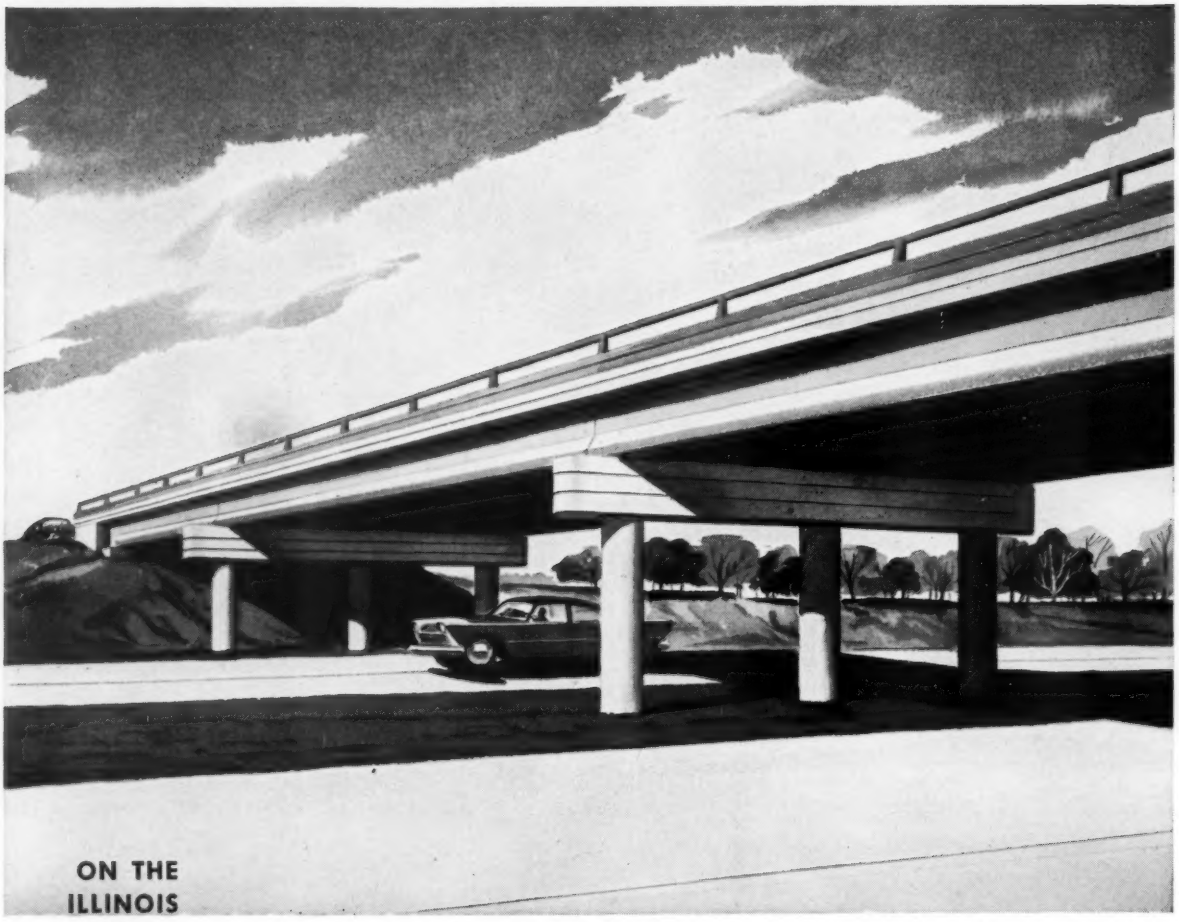
MOSQUITO CONTROL IN ILLINOIS—PAGE THREE

Vol. 11 SEPTEMBER, 1958 No. 4

WHEN AMERICA BUILDS FOR ECONOMY . . . IT BUILDS WITH CONCRETE



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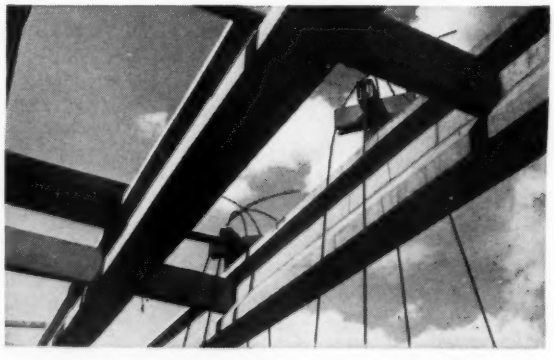

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Single Copy ..... $ .50
Annual subscription 4.00
Foreign subscription 6.00

Entered as second-class matter at the post office at Chicago, Illinois under the Act of March 3, 1879.

Midwest Engineer

A Publication of the

WESTERN SOCIETY OF ENGINEERS

Serving the Engineering Profession

September, 1958 Vol. 11, No. 4

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COVER STORY

A milestone in concrete technology will be achieved October 29 when the American Concrete Institute dedicates its new international headquarters building in Detroit.

Overlooking the rolling fairways of a municipal golf course, the new building is the end result of 10 years effort on the part of the late Henry L. Kennedy and the ACI Building Committee. Designed by Minoru Yamasaki of Yamasaki, Leinweber & Associates, Birmingham, Michigan, as a showpiece in concrete as well as for utility for its international operations, the ACI headquarters building displays the latest developments and techniques in concrete construction. Ammann & Whitney, New York and Milwaukee, were structural consultants on the project with Pulte-Strang, Inc., Ferndale, Michigan, general contractor.

WSE Railroad Excursion Oct. 18, 1958

Western Society of Engineers' first excursion of the 1958-59 year will be on Saturday, October 18, 1958. The Baltimore & Ohio Railroad is providing a special train for the members of Western Society. The "WSE Special" will tour:

Proviso Yards on the Northwestern Railroad with a stop at the Lincoln St. Coach Yard. From there it will go through LaGrange and Argo to Barr Yards, where stops will be made at the yard and engine house. Proceeding eastward it will go through Riverdale and on through to Pine Junction, Indiana. From there the "WSE Special" will go to Whiting Junction where it will be turned and will return to Grand Central Station.

The railroad is providing comfortable coaches, a lunch counter car where sandwiches, coffee and refreshments may be purchased, and a special covered gondola car equipped with seats.

The "WSE Special" will leave Grand Central station at 10:00 a.m. (Daylight Saving Time) and return about 4:30 p.m.

WSE members — bring your wife, children (over 12 years of age) and guests. All this and for only $3.25 per person!

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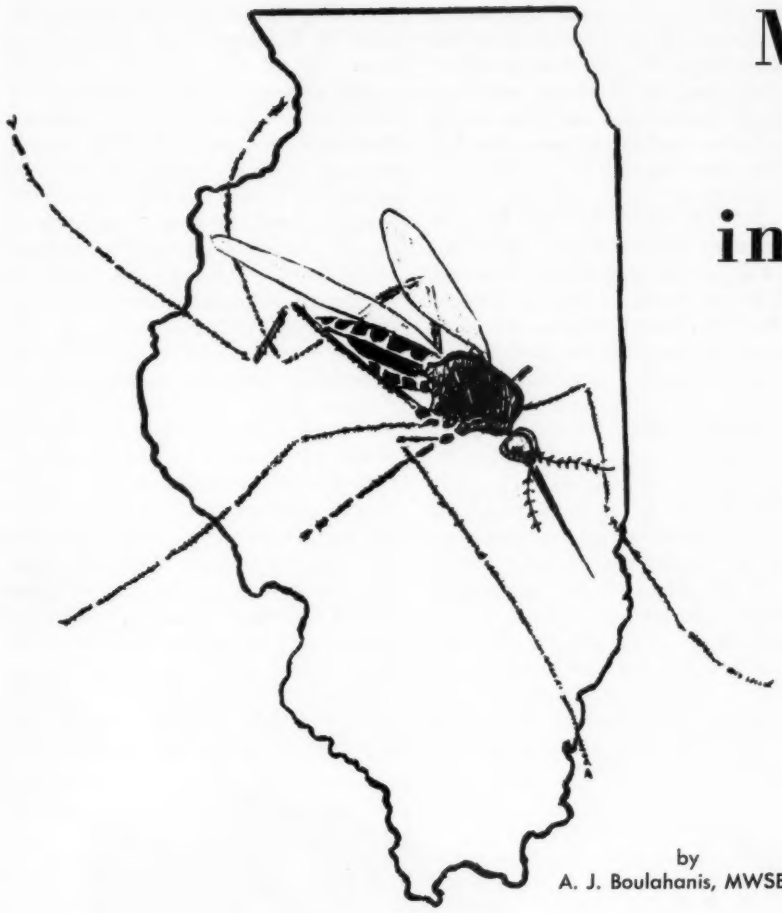

MOSQUITO CONTROL in ILLINOIS

by
A. J. Boulahanis, MWSE

INTRODUCTION

In this era of machines and experts, society finds that next to the abundance of goods and services increasing quantities of time have become available, which may be used as it chooses. As this free time-work ratio adjusts itself to realities, it becomes apparent that a need will arise for developing and fitting this new resource into the folkways of the future.

Aside from new developments, a few existing uses of leisure time will also demand a reconsideration of values. Existing uses, such as suburban living and outdoor recreational activities, will become more enjoyable as a higher degree of environmental control is secured.

To this effect, control activities for the abatement of mosquitoes as a public nuisance will gain impetus and require a scientific administration of methods and financing.

A. J. Boulahanis is an engineer for the South Cook County Mosquito Abatement District, Harvey, Illinois. This paper won a prize of $50 in the Western Society of Engineers 1958 Prize Paper Competition.

Illinois became a territory on March 1, 1809 and was admitted to the Union as the twenty-first state on December 3, 1818. During this period, and even long after, Illinois was known to the easterners as the "graveyard of the nation" due to the prevalence of mosquito-borne diseases, such as malaria and yellow fever. Mosquitoes, particularly species that develop in permanent bodies of water, were abundant because one-fourth of the territory was marsh and over-flow lands. An account by Professor W. H. Keating, who went along on Long's expedition of 1823, described the land and the water table south and west of Chicago as follows:

"From Chicago to a place where we forded the Des Plaines River the country presents a low, flat and swampy prairie, very thickly covered with high grass, aquatic plants and among others, the wild rice. The latter occurs principally in places which are under water; its blades floating on the surface of the fluid, like those of the young domestic plant. The whole of this tract is overflowed in the spring and canoes pass in every direction across the prairie."

The prevalence of numerous mosquitoes during this early era is reflected in J. H. Bunkingham's letter to the *Boston Courier* dated July 11th, 1847. This letter describes one of his evenings spent on a steamer trip from Peru to Peoria while returning from Chicago where he had gone as a delegate to the River and Harbor convention.

"I have heard of flies, and mosquitoes, and bed bugs, and fleas, and sundry other nuisances that are said to infest the Western waters. I have heard of the same kind of troublesome vermin being

rather numerous in Mexico, but I never could be brought to believe one half of what I experienced on board the *Dial*. The boat actually swarmed with them after dark. The heat of the weather and the heat of the boat, and the lights, brought them about us, and I should think that they were, in variety, countless as they were in number. The lady who lately so industriously counted the seeds in a fig, and published the results of her labor in the newspapers, would here have been absolutely foiled. They came and they staid; they were brushed off and fell upon the deck, but their places were immediately supplied by an additional increased number. The seeds in a fig would not grow or increase during the process of counting, but the insects were multiplying from dark until daylight. The floors, the state-room partitions, the mast of the boat, the ceiling, the freight, the baggage, and the passengers were literally covered. We had mosquito nets to our berths, but shutting out the winged insects seemed but to serve as a better chance to allow the creeping things to luxuriate. Some people slept! Happy immobility! I tried segar smoke on the upper deck, and it had a partial effect; but the enemy was invulnerable, and as soon as possible I took my baggage in hand and went ashore at Peoria, and laid down on the steps of the hotel at the top of the hill, to wait for daylight."

Federal Swamp Land Act

Under the Federal Swamp Land Act of 1850, a vast transfer of lands was made—first from the Federal Government to the State of Illinois, next, from the state to the counties, and later to private corporations and citizens. Proceeds from these sales were used by the state for the construction of early drainage works in order to facilitate the reclamation of these lands for agricultural purposes. By 1879, drainage had become so commonplace that laws regulating its application were badly needed. For the benefit of all, the organization of individual drainage district became a legal reality during this year. By 1880, several hundred tile factories were operating in Illinois trying to meet the demand for great quantities of drainage pipe. By 1889 other pressing solutions of drainage problems were required because of the rapid municipal development. Out of this necessity, the state passed another significant drainage law which permitted the creation of sanitary districts. By the end of the 19th century, drainage activity within Illinois had gained full stature and had grown to an impressive size, resulting in the reclamation of millions of acres of marshland.

Pestilential marshes gave way to prosperous agricultural land and urban development. The by-product of this activity was the sharp downward trend in malaria and other mosquito-borne diseases. However, the increased drainage activity, and especially the lowering of the water table by drainage without regard to all phases of mosquito biology created new mosquito problems. Thus the permanent water breeder problem was replaced with the floodwater type. This new twentieth century problem was largely man-made. Flooded situations of a temporary nature developed at a fast pace, mainly due to poor engineering practices such as construction of highways, railroads, drainage systems, and sub-divisions of urban areas without

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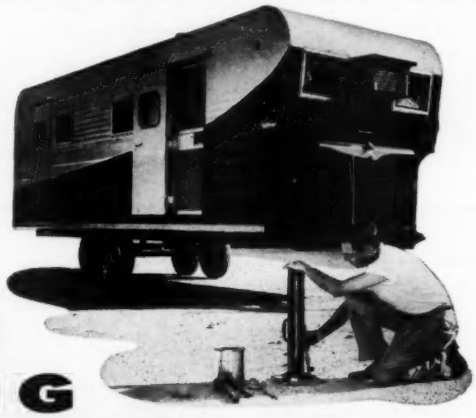

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Ninety per cent of all the scientists who ever lived, are living now, points out *Product Engineering*. Therefore, in the next half century, discoveries as far reaching as electricity and atomic energy, or the invention of the airplane and radio can be expected.

provisions for residual drainage. Likewise, polluted streams and ditches developed rapidly as the problem of economical disposal of raw sewage and industrial wastes increased.

Two other human elements added gravity to the situation; one, the electric lighting system of cities and towns which provide an excellent attractive agent for these mosquitoes, and second, the modern habit of undressing in the summertime which provides more skin exposure for biting.

With increased urbanization the mosquito problem became worse. It was not an uncommon sight to see golfers wearing mosquito nets, gloves and newspapers inside their stockings trying to enjoy a mosquito-free game on the course. Vacuum cleaners within the homes were frequently used to clear the walls and ceiling of mosquitoes, and people could not enjoy their backyards or other out-door activities during the day and the evening.

Under these prevailing conditions the mosquito problem drew metropolitan attention and a few outstanding civic groups were organized to seek some sort of relief from this type of nuisance. In 1921 Colonel Otto McFeely, editor of *Oak Leaves*, a newspaper in Oak Park, Illinois, realized the need for mosquito control and launched a campaign to obtain assistance. During this year he approached the Sanitary District of Chicago and appealed for their assistance in regard to drainage and stream pollution. This plea was heard and the Sanitary District commenced a limited mosquito control program aimed primarily at the reduction of mosquito sources. This program consisted of larviciding and drainage work which was conducted along the Des Plaines River and in the northern part of Cook County where the Skokie marshes were located. Although this work was beneficial to some extent, in 1924 the courts of the state declared such undertakings as *ultra vires* and it was consequently terminated.

During this same year the Ravinia Opera Company, playing in an open air type theater and located in Lake County along the northern shore of Lake Michigan, started a small mosquito control program due to the falling attendance.

Gorgas Institute Request

In 1925 at the request of the Gorgas Memorial Institute of Tropical and Preventative Medicine, Mr. Joseph A. LaPrince, then dean of mosquito fighters, came to Chicago and surveyed the entire metropolitan area. His conclusions were summed up in one statement: "the prevailing problem is mostly man-made."

During this era it was noteworthy to observe that the communities recognized that they had created the mosquito problem and they understood that community effort would be required for its solution.

As a consequence, a few months later the Anti-Mosquito Board of Metropolitan Chicago was formed with the Gorgas Memorial Institute at the head to coordinate all mosquito fighting organizations in the area. Initial funds were provided by the Cook County Board, and the balance was raised by grants and public subscriptions from various municipalities and individuals. The services of Mr. Edwin M. Skinner, Director of Mosquito Control, were secured and the entire metropolitan program was organized in such a manner that any city or town was granted membership in the Anti-Mosquito Board upon its own application. Immediately thereafter a mosquito survey was made by the director of Mosquito Control and the necessary corrective measures were recommended to the city or town authorities. In addition to public support, the Anti-Mosquito Control Board received broad recognition from local newspapers. To this effect the following editorial from the *Chicago Tribune* is quoted:

"Scientific authorities declare that the dangerous and discomforting mosquito pest can be eliminated completely.

"A successful campaign, however, requires the cooperation of everyone in the area. If the whole population understood how simple the problem is, none would shirk apparently insignificant efforts.

"As a means of reaching the greatest percentage of population possible and to inform them of the importance of individual efforts, *The Tribune* has established a Mosquito Bureau to serve as a contact between the engineers of this campaign, the Gorgas Institute, and the people.

"Individual aid will be given in cases where problems of mosquito breeding baffle sufferers; complaints of breeding spots existing on public domain will be submitted to the proper authorities by this bureau. General information on the whole subject, for lay consumption, is also to be disseminated.

"*The Tribune* is interested in the success of this campaign as any other citizen or unit of population should be because the campaign is a step further in the public welfare, a gesture toward health improvement, bodily comfort and

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general well being and happiness among our citizens."

Unfortunately, the prevailing mosquito problem was not as simple as the editorial stated. The solution required sustained funds and professional effort. Furthermore, the area under consideration was larger than was anticipated. As a consequence the mosquito control activities that were performed under the Anti-Mosquito Control Board were limited in nature and extent. However, these mosquito control activities did have a profound effect on the future of organized control in Illinois.

By 1927 many people in the metropolitan areas of Illinois had gained through practical experience and public education a fair knowledge of the prevailing mosquito problem and were highly in favor of combating the nuisance on a community basis with dependable funds.

Mosquito Abatement Districts

Thus the stage was set for mosquito abatement enabling legislation on a state-wide basis, and on July 7, 1927 the General Assembly of the State of Illinois passed a law permitting the creation of mosquito abatement districts. This law was barely more than permissive, and the procedure for forming a district was as follows:

Any contiguous territory having at least 300 inhabitants became eligible for a district, providing that five per cent of the voters petitioned the respective county judge to submit the question of organizing the proposed district to the voters. After fixing the boundaries and holding a public hearing, the question was submitted to the legal voters of the territory involved. If the majority of the votes cast were in favor of the district, the election was conclusive and the district constituted a body corporate and politic, of which all courts were required to take judicial notice. The affairs of the district were governed by a board of five Trustees, who were appointed for a four-year term by the county judge. The financing of the district's operations was obtained from a general property tax, not exceeding the rate of 0.05 per cent of assessed property evaluation in the district. In general, the district was empowered to abate mosquitoes, flies and other insects within the territory, subject only to the higher authority of other municipal and public agencies. The only legal liaison that existed between the districts and the State was the requirement of submitting an annual report of activities to the Illinois Department of Public Health.

This law was preserved in its original form until 1943 at which time the rate of taxation was changed from 0.05 per cent to 0.025 per cent of assessed property evaluation in the districts. At this time property evaluation was increased, and the actual amount of tax revenue remained about the same.

In 1953 an attempt was made to amend the law in order to provide procedures for withdrawal of specific areas. This law did not pass due to the adjournment of the 1953 Assembly. However, when the Assembly adjourned in 1955, it was amended to include these procedures.

These new provisions were applicable only to counties of less than 100,000 population, and such withdrawals were subject to the approval of the State Department of Public Health and to the Illinois State Natural History Survey.

In 1957 a bill was introduced in the State legislature to amend the existing law so as to provide trustees of mosquito abatement districts on an electoral rather than on an appointive basis, but this was not adopted.

Between 1927 and today, aside from the successive formation of mosquito abatement districts, few other important events related to mosquito control took place in the State of Illinois.

Tri-County Control Committee

In 1938 the epizootic of sleeping sickness occurred among horses and mules in northern Illinois. In 1939 the commissioners of Cook, DuPage and Lake counties appointed a Tri-county Mosquito Control Committee to investigate and make recommendations concerning the necessary control measures to be adopted within an area extending 15 miles beyond the metropolitan districts of Chicago and its adjoining recreational area. The chairman of this committee was Dr. Spencer S. Fuller, then president of the Board of Trustees of the Des Plaines Valley Mosquito Abatement District and active in mosquito control work. The investigational work of this committee was carried out under the supervision of Mr. J. Lyell Clarke, engineer of the Des Plaines Valley district. The work of this committee was greatly facilitated by the Federal Works Progress Administration, but when the W.P.A. activities were discontinued, this project was terminated. Although the survey work which was conducted under this program was incomplete, the final report of the Federal Works Administration that was published in 1940 called attention to the fact that there was a potential of 66,698,000,000 mosquitoes in the County of Cook, and that approxi-

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ILLINOIS MOSQUITO ABATEMENT DISTRICTS

Name	Established	Area Sq. Mi.	Estimated Population	Tax Revenue	Most Abundant Species
Carbondale	1927	10	18,000	6,000	Culex
Lake Forest	1927	16	9,000	14,000	Aedes vexans
North Shore*	1927	75	275,000	128,150	Aedes vexans
Des Plaines*	1927	77	250,000	127,118	Aedes vexans
Highland Park	1931	18	22,000	16,000	Aedes vexans
Herrin	1932	4	8,000	8,000	Aedes vexans
Cairo	1940	8	11,000	3,500	Aedes vexans
Dupo	1940	6	4,000	1,600	Aedes sollicitans
Freeport	1948	49	26,000	15,000	Aedes vexans
Lake Bluff	1951	2	2,700	2,800	Aedes vexans
South Cook County*	1952	340	750,000	400,000	Aedes vexans
Franklin	1953	36	30,000	4,000	Aedes sollicitans
Glen Ellyn	1954	8	15,000	8,000	Aedes vexans
Wheaton	1955	17	20,000	10,000	Aedes vexans
West Chicago	1956	24	15,000	8,000	Aedes vexans
Northwest Cook*	1956	250	110,000	100,000	Aedes vexans
Itasca	1956	2	3,000	1,600	Aedes vexans
TOTALS		942	1,568,700	853,768	

Note*: Districts marked with (*) are located in Cook County.

From the above tabulation it is apparent that the 17 districts, totally, cover an area equivalent to 1.67 per cent of the State's territory and serve directly 16.7 per cent of its population. It is also clear that nine of the above districts have been organized during the last 10 years, and they in turn cover 77 per cent of the total area served by all 17 districts.

These ratios reflect the geographical location of the districts and the growing importance of mosquito control in Illinois. It is noteworthy to observe that the larger districts are located in the County of Cook, wherein they cover approximately 78 per cent of the territory and serve directly only 28 per cent of its population. Revenue-wise, the mosquito abatement districts in Cook County collect taxes on one-third of the total assessed property evaluation. The other two-thirds of assessed property evaluation, which is not taxed for mosquito abatement purposes, lies within the corporate limits of the City of Chicago and Leydon Township and represents 22 per cent of the Cook County area and 72 per cent of its population.

mately 50 per cent of these mosquitoes originated in the ten southern townships.

In May of 1947 the American Mosquito Control Association made a visit to the Chicago area and observed extensive field demonstrations at Wood Dale Woods, near Bensenville, Illinois, which were conducted by the Des Plaines Valley MAD.

In 1951 the Illinois Mosquito Control Association was organized and met jointly with the American Mosquito Control Association on March 5-8 at the Drake Hotel. At this annual convention, representatives of various mosquito control and government agencies throughout the country met. The subject of equine encephalitis, a disease transmitted by the mosquito, received special attention during this meeting.

In February of 1955 the Illinois Mosquito Control Association held its first reorganized conference at the University of Illinois in Champaign. During the following two years, the IMCA continued to hold its annual conferences at the University of Illinois.

During the mosquito season of 1955 an outbreak of encephalitis occurred in West Salem, a small town in the southern part of Illinois. Public health records indicated that there were five confirmed cases in West Salem and other numerous cases in adjoining Indiana. An unusual abundance of blackbirds and mosquitoes in the area were suspected to be the reservoir and transmitting agent of this virus respectively.

Seventeen Districts

As of this date (Jan. 1, 1958) a total of 17 mosquito abatement districts have been organized, the majority of which are located in the northern part of the state. A tabulation presented here on this page indicates the names of these districts, the time they were established, area and population served, the approximate tax revenue upon which they operate, and the most abundant species of mosquito in the district.

Although there are about 52 species of mosquito in Illinois, it may be surmised from the following tabulation that *Aedes vexans* is the most abundant species. In regard to the annual nuisance caused by mosquitoes in general, it may be estimated in terms of money at several million dollars.

During the past 30 years of organized mosquito control in the State of Illinois great progress has been made in the application of techniques of waging warfare against these pests. Although chemical warfare has been very helpful, the elimination of many sources through the application of engineering techniques has been of paramount importance. A few of the outstanding woodland and

rural projects were the transformation of the Skokie marshes by C.C.C. labor in the 1930's into the Skokie Lagoon Preserve, the construction of many wildlife oases throughout the Des Plaines Valley Mosquito Abatement District, and the improvement of the many drainage channels throughout the state. Many of these projects are located in the County of Cook and are here today to testify of their relative importance to the general public.

Public Nuisance Problem

From the foregoing, it may be surmised that in the State of Illinois, the prevailing mosquito problem is primarily of public nuisance value and that during the last decade respective mosquito control activities have flourished. It is interesting to note that the bulk of this recent growth of mosquito control activities has been centered in the environs of the Chicago metropolitan area, where a great exodus of population into the suburbs has occurred and leisure time expressed in outdoor recreational activities has increased steadily, parallel with the increase of disposable income. Since suburban living and outdoor recreational activities are most enjoyable during the spring, summer and fall seasons, they are dependent to a great extent upon a mosquito-free environment.

The necessity of approaching the mosquito problem on a metropolitan basis, such as Cook County in it's entirety, stems from the severe annoyance season, which was witnessed throughout the metropolitan area a few days after the storm of July 12, 1957, and from a new conception of today's actual mosquito abatement needs and related financing.

The 1957 mosquito season within the Chicagoland area clearly demostrates the inability of prevailing control measures to cope with the nuisance problem. In contrast with flood control practices, which deal with a very small interval of time as a criterion, mosquito control work is afforded several days to alleviate the problem. Although Cook County is unique in climatic conditions and mosquito prevalence, it differs in topographical features, drainage patterns and consequently in the location of mosquito breeding sources. In general the majority of the sources are located in the environs of Chicagoland and many natural mosquito resting places are scattered throughout the area. Mosquitoes escaping from the sources, migrate towards the cities, towns and villages, where they have an excellent chance of obtaining a human bloodmeal during the evening hours and rest during the day in the many playgrounds. The pronounced lack of uniformity in methods and costs of treating the problem, may be traced back to the Mosquito Abatement Law, which does not contain provisions related to the abatement of mosquitoes on an equitable tax structure.

In conclusion, just as the engineer, scientist and industrialist have worked methodically towards forming America's modern technology, which has produced greater quantities of disposable income and time, it now appears that a similar task, the creation of a mosquito-free environment for metropolitan areas on an equitable basis, warrants scientific consideration.

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Pittsburgh to Host AIEE Fall Meeting

Pittsburgh, Pa. will be host to the Fall General Meeting of the American Institute of Electrical Engineers Oct. 26-31, it has been announced by A. A. Johnson, general chairman. It will be the first time the Institute has had a general meeting there.

Theme of the general session Monday, Oct. 27 in the ballroom of the Penn-Sheraton Hotel, meeting headquarters, will be "Atomic Energy and the Shippingport Project," with Mark Cresap, president of Westinghouse Electric Corp., speaking on atomic power.

Ten technical sessions are planned during which many of the committees and subcommittees in the six technical divisions of AIEE are planning 67 sessions on nucleonic and radiation instruments, data communications, management, research, electronics, safety, mining industry, communications, power generation, transmission and distribution, industrial and commercial power systems, basic science, computers, education, land transportation, nucleonics, radio and television and related subjects.

Inspecting trips are planned to the U. S. Steel Corporation, Westinghouse Electric Corp., Forest Hills and Waltz Mill atomic installations, Duquesne Light Company's atomic power station at Shippingport, Aluminum Company of America and Pennsylvania Railroad.

To Read Papers

Approximately forty technical papers will be presented at the Mid-America Minerals Conference to be held by the American Institute of Mining, Metallurgical, and Petroleum Engineers in St. Louis, Oct. 23-25, 1958.

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6:30 KICK-OFF DINNER — Chef Behrens has promised an outstanding menu for this dinner. Bill Marston, your new President, is going to outline some tremendously important plans.

8:00 IMPRESSIONS OF RUSSIA — You will see the people of Russia from Leningrad to the Black Sea — at work and at play. Our own Bob Bacon on the 4 month "around the world" trip he and Ruth completed in August spent 3 weeks in Russia taking some of the most interesting and unique color movies ever to have come out of that country.

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Take a boat trip down the Volga and Don Rivers and see the real peasant country of Russia —

See the new apartment house projects at Leningrad with an intimate view of their living quarters —

See the Children's Railway at Rostov — where 1000 children from 7 to 17 are taught every phase of railroading by operating a half size railway system.

Take a trip into Georgia — Stalin's home country and see scenery that will remind you of Yosemite — and many more fascinating shots of Russia!!!

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Convention of International Flavor

The annual convention of the American Society of Civil Engineers, scheduled for Oct. 13-17, at the Hotel Statler-Hilton in New York City, assumes an international flavor with several joint sessions scheduled with the International Association of Bridge and Structural Engineers.

Fourteen European engineers, representing eight countries, will present papers with 14 American engineers at joint sessions of the Society's Structural, Engineering Mechanics and Construction Divisions during the five-day program.

While the joint meetings with AIBSE highlight the convention, other divisions of the Society will account for more than 100 papers to be delivered during the sessions, affording a well-balanced program, according to Society policy. More than 1,000 members are expected to register.

Urban redevelopment will occupy the attention of the membership at a luncheon on the opening day of the meeting, at which Prescott Bush, U. S. Senator from Connecticut, and a member of the Senate Subcommittee on Housing, will be the principal speaker. Several papers also are scheduled on the subject of city planning.

Installation of new officers of the Society will take place at the annual meeting. Francis S. Friel, of Philadelphia, who has been designated as the official nominee for 1959 president of the Society, will take over the office from Louis R. Howson, MWSE, of Chicago, 1958 president. Two new vice-presidents and seven directors also will be installed at the same time.

Thirteen of the Society's 15 divisions will sponsor 52 sessions during the five-day meeting, many of which will run concurrently so that as many subjects as possible can be covered during the convention period.

One of the sessions of special interest will have papers devoted to problems related to the construction of buildings on ground with a permanent frost condition. Continued exploration and settlement in polar areas have made such studies obligatory.

Also of special interest are papers related to the role of U.S. contractors in overseas construction. Other papers on foreign subjects relate to engineering problems in Columbia, Venezuela, Spain, Sumatra and Canada.

At a dinner of the American Institute of Consulting Engineers, held in conjunction with the ASCE convention, the Institute's Award of Merit will be awarded to James R. Killian, special assistant to the president of the United States for Science and Technology.

Sharp . . . but Should He be a Scientist?

Tommy may know more than his science teacher does about some aspects of physics—but that doesn't mean he should be a scientist.

Through rocket clubs, high school science fairs, and outside reading, high schoolers may advance beyond their teachers in knowledge of some aspects of propulsion or electronics, according to Robert W. Estin, instructor in physics at Illinois Institute of Technology, Chicago.

"But don't be overconfident about your teenager's brain power," he warned parents.

"The interest shown by hundreds of youngsters through extracurricular work in scientific fields does not make up for the fact that their science education is limited by the shortage of high school science teachers.

"In some high schools, teachers have been 'drafted' out of their fields to teach an unfamiliar science — often one in which they are not really interested. Sometimes there just aren't enough science teachers to go around."

In these schools, Tommy is forced to make a choice—either to regard science as a bore or to turn outside the high school for a scientific education.

"It's amazing how many students come to college determined to be physicists with an interest in the field gained from a home experiment in rocket propulsion, for example. In college they find that they are seriously lacking in many basic aspects of science and mathematics," he said.

"In addition to a formal foundation in these subjects, a future scientist must enjoy balancing an equation or solving complicated mathematical manipulations underlying a problem, as well as enjoying carrying on the experiment itself," he cautioned.

Estin advocated raising high school educational standards in all areas—not only science, but also the humanities.

"Crash programs in either physics or philosophy will mean a series of short-term gains. A country's future is not measured by how many satellites it has in the sky, or how soon it sends a man to the moon," he concluded.

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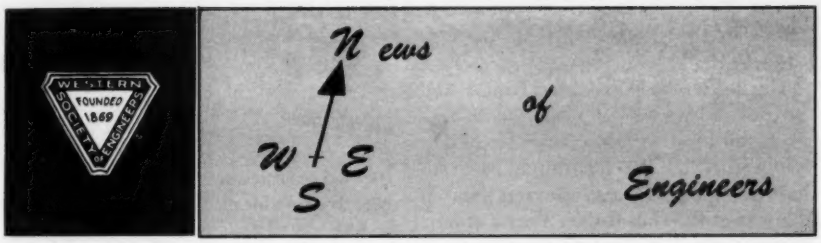

A. A. Milkie has been appointed manager of the Chicago District of the Pangborn Corporation, Hagerstown, Md., manufacturers of abrasives, blast cleaning and dust control equipment.

Milkie has served with Pangborn as a sales engineer in the Chicago district since 1951 and in his new position will direct Pangborn's extensive field engineering service and staff of sales personnel. His headquarters will be at 2435 North Halsted Street, Chicago, Ill.

Milkie received his bachelors degree in Mechanical Engineering from the Clarkson College of Technology and is a member of ASME, American Foundrymen's Association, and the Blast Furnace and Coke Oven Association.

* * *

The Asphalt Institute has named Allison D. Hill of Topeka, Kansas, to fill the new post of district engineer for Illinois.

Hill, a 26-year veteran design, construction, and materials engineer with the Kansas Highway Commission, serves the state of Illinois from his office at 2606½ South Sixth Street, Springfield.

The new Institute district engineer, an alumnus of the Topeka public schools, received his engineering degree from the University of Kansas in 1932 and began a career with the Highway Commission, which was interrupted by a four-year stint with the Army during World War II.

As a commissioned officer in the Corps of Engineers, Hill worked on the construction of the Alcan Highway and served with engineering construction units in the Aleutians, France, and Okinawa.

Hill returned to his position as Materials Engineer with the Kansas Highway Commission in 1946 and continued in that post until joining The Asphalt Institute.

The new district engineer is a member of the Kansas Engineering Society and a licensed professional engineer in the Sunflower State. He will serve under the direction of Division Managing Engineer W. L. Hindermann in St. Paul, Minnesota, whose division encompasses the midwestern states from Illinois to Idaho.

* * *

Latrobe Steel Company has named S. L. Weaver as district sales manager of its Chicago office, covering Illinois and key areas in Indiana and Michigan.

Long active in the steel industry, Weaver earlier served as Latrobe district manager of sales in both the Buffalo and Pittsburgh areas, and as a sales engineer out of the company's Chicago office. Before joining Latrobe, Weaver was associated with U. S. Steel as a service and development metallurgist.

A native of Mechanicsburg, Mr. Weaver graduated from Penn State University, receiving a BS in Metallurgical Engineering. He served during the war as Lt. Comdr. USNR.

* * *

Norbert T. Grainer, assistant to the manager of the Skokie, Ill., plant of General Controls Co., has been appointed regional manager for the automatic controls firm in the middle west with headquarters at Cleveland, Ohio.

The announcement was made by J. F. (Jack) Ray, vice-president, sales.

Grainer is a native of Chicago, and has been with General Controls for more than eight years, starting as sales engineer in the Chicago branch. He has been assistant branch manager and branch manager in Chicago before becoming account executive for appliance control sales and assistant to sales manager at Skokie, Ill., where General Controls produces automatic pressure, temperature, level and flow controls.

* * *

The appointment of Dr. Roger H. Hildebrand as associate laboratory director for high energy physics at the Argonne National Laboratory has been announced by Dr. Norman Hilberry, Laboratory Director.

Dr. Hildebrand, who has been associate professor of physics at the University of Chicago's Enrico Fermi Institute for Nuclear Studies, assumed his position at Argonne September 2, 1958.

Dr. Hilberry explained that Dr. Hildebrand will occupy a newly-created post at Argonne.

Commenting on Dr. Hildebrand's appointment, Dr. Hilberry said:

"In the years to come, Argonne promises to play an increasingly import-

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ant role in high energy physics. We are confident that Dr. Hildebrand, because of his brilliant record in the research laboratory and his intellectual vigor, will help assure that Argonne will become a principal center for accomplishments in high energy physics. We also believe that Dr. Hildebrand and his staff will provide strong support for all of the institutions in the middle west which are interested in exploring ths promising scientific frontier with the aid of facilities such as those which will be available at Argonne."

Argonne has received AEC authorization to proceed with design studies for a 12.5 billion electron volt zero gradient proton synchroton to be located at its Lemont site. Cost of the facility is estimated at $27,000,000 and the AEC has made available $1,500,000 initially for detailed design work.

High energy particle accelerators are important tools for basic research and have greatly advanced knowledge of nuclear structure and reactions. The new Argonne machine will produce greater numbers of accelerated particles than any other of the multi-billion-electron volt accelerators (sometimes called "atom smashers") now in operation or under construction anywhere in the world.

Dr. Hildebrand is an alumnus of the University of California. He was awarded an A.B. in chemistry there in 1947 and his doctorate in physics in 1951.

During World War II, Dr. Hildebrand was employed as a physicist at the University of California's Radiation Laboratory on the separation of uranium isotopes. He also worked late in the war at the Oak Ridge, Tenn., atomic energy research center. His research efforts included work in the development of long-life ion sources for "Calutrons" (high current mass spectrometers).

Research "firsts" credited to Dr. Hildebrand include: experiments to demonstrate shadow-scattering of high-energy neutrons; the finding of evidence for odd parity of neutral pions by studying pion production in light isotopes; experiments to establish conservation of isotopic spin in pion production (This was one of the first successful applications of Cerenkov counters); with D. E. Nagle, the conducting of experiments to show that superheated liquid hydrogen is radiation sensitive; and the building of the first liquid hydrogen bubble chamber and used it to study S-wave phase shifts in meson scattering.

At present, Dr. Hildebrand is engaged in Mu-meson-nucleon interactions research at the University of Chicago.

Dr. Hildebrand is a member of the board of directors of the Midwestern Universities Research Association. He also is a fellow of the American Physical Society.

* * *

The appointment of a Cincinnati, Ohio, distributor for the Wonder Building Corporation of America, Chicago, has been announced by Peter S. Pedersen, Jr., president.

The distributor is Oldfield Equipment Co., 430 W. Seymour Avenue, Cincinnati 16. John J. Oldfield is head of the company.

Wonder Building Corporation manufactures a complete line of pre-engineered trussless steel buildings for farm and industry, and pre-engineered "Truss-Skin" steel roof deckings for convention halls, auditoriums, hangars, supermarkets, skating rinks, gymnasiums, and swimming pools.

* * *

Two University of Illinois civil engineering professors, Anestis S. Veletsos and Dr. Nathan M. Newmark, have been named co-winners of the coveted Norman Medal of the American Society of Civil Engineers, it has been announced.

At the same time, the society announced that Dr. Newmark also has been awarded the 1958 Ernest E. Howard Award.

The Norman Medal was awarded Prof. Veletsos, research assistant in the Department of Civil Engineering, and Dr. Newmark, research professor, Structural Engineering, for their paper entitled, "Natural Frequencies of Continuous Flexural Members," which appeared in Volume 122 of the Society's "Transactions."

The 1958 Howard award went to Dr. Newmark for his contributions in the field of structural analysis and design, as well as his specific contribution to the advancement of structural engineering in the Aseismic design of the Latino Americana Tower in Mexico City. A prize of $100 goes with the award.

Dr. Newmark is the winner of two previous awards by ASCE—the 1945 J. James R. Croes Medal and the 1950 Moisseiff Award. He has been a member of the staff at Illinois since 1930.

Prof. Veletsos is a native of Istanbul, Turkey, and a citizen of Greece, coming to the United States in 1948. He has been at Illinois since 1953.

The awards will be officially presented at the annual convention of the Society in New York City on October 15.

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Reviews of Technical Books

Cams

CAMS, by Harold A. Rothbart, John Wiley and Sons, Inc., New York 16, N.Y. First edition, 1956. Pages, 350. Price, $9.50.

This book provides another basic tool for the designer concerned with creating a mathematical function, motion, mechanism, machine or mechanical computer. It can also be useful to engineering students and instructors as well.

There are eleven chapters, 210 illustrations and many examples in each chapter worked out in detail to help the reader understand the text. Each chapter includes a summary of the important points as well as a list of references. The mathematical treatment, however, is kept to a minimum, only that significant to the design being presented.

To develop this broad subject of cams, the author has applied both theoretical and practical excursions into Kinematics, Dynamics, and Machine Design.

Most of the basic subject matter taught in kinematics and machine design are included in this text, however, because of the increasing need of higher speed machinery required in industry, the author has expanded this field in great detail. As vibrations play an essential part in the design of cams operating at high speeds, the following relevant points are included: (1) the shape of the acceleration curve, (2) the flexibility and backlash, and (3) the accuracy of the cam profile in terms of its effects on the performance of the mechanism.

Included in the later chapters are discussions on Advanced curves, Polydyne cams, the dynamics of High-Speed cam systems and Force analysis. For these chapters the reader should have an understanding of basic vibration theory.

The surface materials, stresses, and accuracy in the manufacture of these higher speed cams and special cams and applications of same are covered in the last two chapters.

H. A. Rothbart is a member of the Mechanical Engineering Department of The City College of New York as well as a Consulting Professional Engineer.

Composite Construction

Composite Construction in Steel and Concrete, by Ivan M. Viest, R. S. Fountain and R. C. Singleton, McGraw-Hill Book Company, New York 36, N. Y. 1958. Pages, 176. Price, $7.50.

Since 1935 the use of composite construction in both the bridge and building fields has increased tremendously. In recent years the design of composite construction for highway bridges has become somewhat uniform through early publication of specifications which embodied basic design principles. Up to the present time the design information available to the designer has been scattered in location and not in a form adaptable to quick reference. This book was prepared as a design aid to overcome this handicap. Most of the design emphasis is placed on composite bridge construction rather than composite building construction.

The text follows the latest bridge specifications of the American Association of State Highway Officials and contains design formulas with tables and graphs for preliminary design. While the text assumes that the designer is familiar with the ordinary design of concrete slabs and steel beams it does contain explanations of the basic principles of composite design.

The basic problem in the design of a composite beam is the proper selection of its cross-section. Since there is a large number of possible combinations of slab thicknesses and steel beams the final selection of the cross-section is a trial procedure. The method for selecting the cross-section is contained in Chapter 2. This chapter also includes equations for computing stresses after the cross-section has been selected, formulas for computing length of tension cover plates, and discussions of composite design for continuous beams and of deflection calculations.

Designs of shear connectors are covered in Chapter 3. Formulas given for the capacity of stud, channel and spiral shear connectors and for the safety factor are the same as those required by the latest AASHO bridge specifications. Comparisons of the three types of connectors and data on the properties and use of stud connectors are also included in this chapter.

Chapter 4 is devoted entirely to typical designs of composite beams and shear connectors. Six of the more common types of superstructures are covered including both simple and continuous beam spans. For the more ambitious designer who wishes to study composite construction in more detail, Chapter 6 lists the publications which cover the background of the material presented in this book. The list of publications has been broken down into (1) Research, (2) Design and (3) Construction.

Soil Mechanics

Soil Mechanics, Foundations, and Earth Structures, by Gregory P. Tschebotarioff, McGraw-Hill Book Company, New York 36, N.Y. Pages, 665. Price, $7.75.

Mr. Tschebotarioff's book relates soil mechanics and foundation engineering to solution of design and construction problems.

Chapters 1 through 6 are concerned with properties of soils, and field and laboratory tests to determine characteristics of soil. Chapters 7 through 11 describe the principles and techniques of soil mechanics, illustrating its importance and relating it to engineering design and construction. Chapter 12 describes methods of exploration, identifying, and classifying soils. Chapter 13 concerns the selection of suitable foundation types for purpose and conditions. Chapters 14 through 19 deal with design and construction practices for foundations and earth structures. Pertinent facts and data are provided for use by engineers.

Bridge Competition Offers $44,000

A steel highway bridge design competition offering 15 awards totaling $44,000 to engineers and college engineering students is being sponsored by American Bridge Division of United States Steel Corporation, it has been announced by Austin J. Paddock, division president, and L. Abbett Post, executive vice president of the American Instiute of Steel Construction, who will administer the program.

The competition is dedicated to the stimulation of the best use of steel in the design of bridges for the 41,000-mile system of interstate and defense highways to be built during the next 15 years.

It has been estimated that more than one bridge per mile of road will be required to complete the vast network of highways that will link all parts of the nation.

"Being the strongest and most versatile construction material, readily available and familiar to all engineers, steel will save the program many a day and dollar in the next 15 years," Paddock said. "But we in American Bridge are convinced that steel can contribute even more if the engineering mind is stimulated to a more imaginative and effective use of its abundant properties."

Open to professional and design engineers and to college engineering students, the competition poses the problem of designing an overpass structure in steel to carry a two-lane highway at right angles over a four-lane interstate highway on level ground. The overpass must be designed in accordance with standards developed by the American Association of State Highway Officials and approved by the U. S. Bureau of Public Roads. These standards are entitled "Geometric Design Standards for National System of Interstate and Defense Highways."

Eight awards will be made for winning entries submitted by professional and design engineers, including a top award of $15,000. Other grants in this category will include $10,000 for first honorable mention, $5,000 for second honorable mention, and $1,000 each for five third honorable mentions.

College engineering students will compete for $9,000 in awards, with the first award being $4,000. Also to be given are $2,000 for first honorable mention, $1,000 for second honorable mention, and $500 each for four third honorable mentions.

All entries will be judged on the basis of originality of design, utilization of the properties of steel, economy, and appearance of the structure. The type of overpass structure, length of spans, and other factors will be left to the discretion of the entrant.

Any professional and design engineer and college engineering student may enter the competition, except employees or members (and their immediate families) of the following organizations: United States Steel, its divisions, subsidiaries, agents and dealers; structural steel fabricating firms; the American Institute of Steel Construction; and the competition's rules committee and judges.

Contestants are limited to a single entry, although two or more individuals may submit a joint entry.

All entries in the competition will be judged by a special jury of award under the chairmanship of L. Abbett Post. The jury will consist of at least five members of the competition's rules committee, which is composed of 17 distinguished engineers and architects.

Complete information on the competition may be secured from American Bridge Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, and from the American Institute of Steel Construction, 101 Park avenue, New York 17.

Deadline for entering the competition is midnight, May 31, 1959. Entries should be mailed to the Institute of Steel Construction at the above address.

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Company Links Plants With Perforated Tape

An electronic communication system which uses perforated tapes to transmit and receive messages has been inaugurated by The Babcock & Wilcox Company to link 17 Tubular Products division plants and district sales offices over a 3,824-mile network, the company has reported.

William J. Thomas, vice-president in charge of the Tubular Products division, said that the system, under development for more than a year, "has been adopted primarily to give customers the fastest service possible."

Similar to a news wire service in that it reaches many points simultaneously, the intricate closed-circuit network makes duplicate copies of sales information available at the same time to all plants and sales offices within the division. It is expected to speed up order handling and deliveries, and eliminate costly time lapses and paper work duplication.

Operation of the integrated data processing facility began in July, 1958, when an order was sent by the Los Angeles district sales office to the Beaver Falls, Pa., plant at the rate of 75 words per minute. The taped message was automatically and simultaneously typed as it was received at Beaver Falls.

The system makes it possible to produce additional copies of data simply by re-running the tape. The tape becomes a permanent part of the office files and leaves no margin for error should a re-run of any particular message be necessary.

IRE in Program with IIT, Army

Growing problems of electromagnetic interference with the proper functioning of military electronic equipment were scheduled for discussion at an Army sponsored conference at the Museum of Science and Industry, Chicago, on Oct. 1-2.

The meeting, the fourth Conference on Radio Interference Reduction and Electronic Compatibility, was conducted by Armour Research Foundation of Illinois Institute of Technology under agreement with the Signal Research and Development Laboratories at Ft. Monmouth, N. J.

The Institute of Radio Engineers Professional Group on Radio Frequency Interference cooperated in the presentation of the program.

Several of the papers presented dealt with the utilization of computer techniques in relation to large scale interference problems. These included discussions of predicting the amount of interference existing among various parts of a system, how much interference will be created by the components, and maximum utilization of available frequencies to reduce interference.

Other papers were devoted to instrumentation for obtaining objective measurements of the strength of interference, and methods of suppressing interference in equipment.

Discussions of mutual interference between radar installations included the effect of assigning separate frequencies, equipment spacing, the effect of using modulation of varying characteristics, and operational techniques as a means of diminishing radio interference.

"The problems confronting military leaders," Conference Chairman Stanley I. Cohn, assistant manager of electrical engineering research at Armour Research Foundation, summarized, "are how to predict how much radio interference will be created by electronic equipment in an area, how to measure the amount of interference in terms of numbers for greater precision, and how to obtain and maintain effective operation of the equipment."

Approximately 450 persons representing the Armed Forces, industry, research, and education were expected to attend the conference, according to Cohn.

Some 35 papers dealing with the military and other aspects of the problems of radio interference reduction were presented at the two-day meeting.

"Systems of Units..." Is Theme of Meeting

The National and International Aspects of Systems of Units in Coordinated Disciplines of Science and Technology will be the theme for the Section M-Engineering portion of the program for the Annual Meeting of the American Association for the Advancement of Science and will be held at the Hotel Statler in Washington, D. C. on December 29 and 30, 1958.

A program has been designed to lay before the public a clear cut picture of the systems of measurement now in use in various parts of the world and the need for clarification and understanding to permit the greater interchange of knowledge and to aid and assist industry and commerce.

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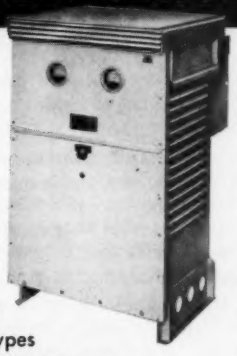

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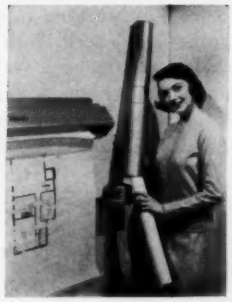

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Mica, a Material Of Fascination

Mica, once a material of fascination for kids when the horseless carriage was reaching its maturity is, today, the center of some concentrated research.

Research in connection with mica is not a further exploration of its properties and uses, but a search for a substitute with the same properties

Horizons Incorporated is one of several research organizations working on this important problem. This challenging problem has been tackled before in the United States and abroad with, as yet, no perceptible gains being made.

Why the importance of mica? It is made from a unique and small group of silicate minerals which lend themselves to being split into thin sheets and, as such, have a wide variety of uses in the electrical and electronic fields. Sheet mica is used principally in the electrical industry for dielectric purposes in condensers, for the insulation of transformers and radio tubes, and generally, in other industries where there is a requirement for a transparent sheet material having reasonably high temperature properties.

Horizons is working to find a means of synthesizing sheet, block or film mica which has always been very difficult to obtain, hence has been very expensive. Mica is classified generally as block, film and splittings. Top quality material of these types is necessary for the electronics industry. Because very small quantities of top quality mica are obtained from a ton of the free-mined material, the higher grades call for premium prices, ranging up to $60.00 per pound.

Widely distributed, mica's best grades, however, come from India, which supplies approximately 70 per cent of the world's requirements. The United States is the largest consumer, using approximately 15 million pounds of sheet grade annually for peacetime use. Of this amount, 90 per cent is imported from India.

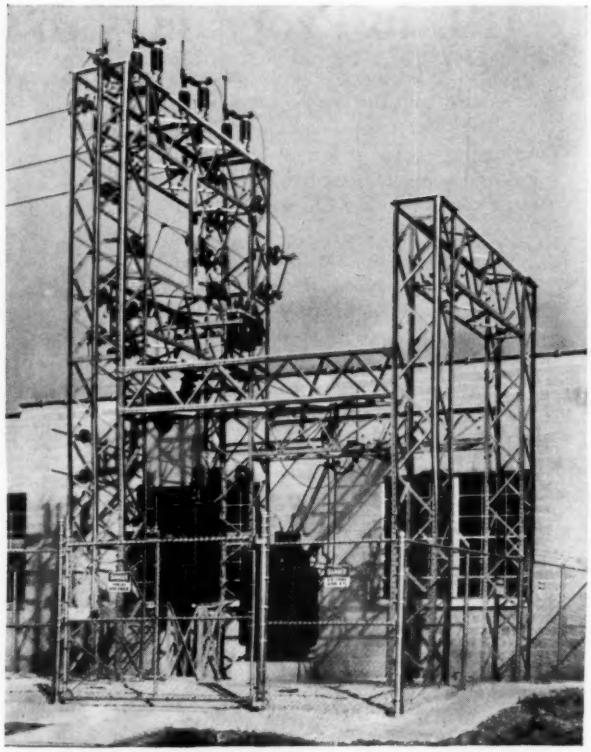
During recent wartime production, and despite the bonus impetus, only 12 per cent of our requirements generally was obtainable. It was this short supply which led to the present stockpiling and today's search for a substitute material.

For Details on *WSE's Railroad Excursion*

Please See Page 2

For Details on *WSE's Kick-off Party*

Please See Page 9



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New Products

As described by their Manufacturers

Stepping Switches

Automatic Electric Company, Northlake, Ill., manufacturing subsidiary of General Telephone, has announced that its Industrial Products Division can now supply, when specified, some types of rotary stepping switches and relays equipped with semiconductor spark suppressors. The company is manufacturing its own silicon-carbide varistors to replace the capacitor-resistor combination formerly used for spark suppression on all 24, 48 or 110 volt d.c. Types 44 and 45 rotary stepping switches and Series OCS relays. Besides offering advantages in weight and space reduction, the varistors are said to suppress arcs more effectively and reduce radio interference appreciably.

Varistors, coated with a tough insulating film, in three colors for quick identity, are of very small size—approximately 7/8" diameter x 1/8" thick. Because of their size, they can be mounted and wired directly to the terminals of the coil, thus eliminating the need for separate mounting, a disadvantage of the capacitor-resistor combination.

In addition, loose varistors, provided with two, two-inch leads of tinned copper wire (22 Ga.), are available for replacing capacitor-resistor spark suppressors on Types 44 and 45 stepping switches, and Series OCS relays, now in service.

Microtubing

Monsanto Chemical Company has announced it will produce microtubing three-one-thousandths of an inch in diameter—so small that it compares in size to a human hair.

Tentatively named Santotube Q, the tubing will be offered by the company's Inorganic Chemicals Division, according to Dr. Joseph J. Burbage, director of development for the division.

The tubing, made of quartz, was originally developed by Monsanto research scientists in fiber form for the Atomic Energy Commission, Burbage said. The fibers were used in the construction of microbalances capable of weighing accurately to one-three-billionth of an ounce (one-ten-thousandth of the weight of a grain of salt). Further development in Monsanto's laboratories resulted in production of the tubing.

The tubing, which has many desirable characteristics for industrial applications, is now available to industry, Burbage said. As further illustration of its size, Burbage pointed out that it would take 40 miles of the tubing to weigh a pound and a 50-foot length to hold a single drop of water.

In addition to its tiny size, the tubing is so flexible it can be tied in knots, has a greater tensile strength than steel, is resistant to high temperatures, is highly inert to chemicals and is a nonconductor of electricity.

As an example of industrial application, Burbage pointed out that the tubing is expected to play a prominent part in a new Bell Laboratories development for recovering upwards of 4 billion cubic feet of helium now lost annually in natural gas. Heart of the diffusion cell in the Bell process is Monsanto's very fine quartz tubing. Bell's bench scale cells use about a mile of the tubing; production-scale cells are each expected to use about 7 billion feet (1.5 million miles).

Spotweld Nut

The new XN spotweld nut developed by the Ohio Nut and Bolt Company of Berea, Ohio, incorporates several new design and construction features which speed welding and help assure optimum welds within a wide range of weld settings.

This new primary fastener which can be welded to components with the same weld settings used to join assemblies has an electrode "target" area . . . a circular recess with beveled edges . . . that guides the weld tip into position for optimum welds.

Because the metal in this welding area is thinner, welds are made with less current and pressure and lighter, less expensive welding equipment may be used. The new target also enables better accuracy and consistently better welds with rocker arm equipment used at an angle and with portable welders.

Designed primarily to be welded to thinner sheets, the XN nut's low streamlined shape makes it highly useful in applications where maximum fastener strength is required but space is limited.

In addition to the welding target area, the new XN spotweld nut has the exclusive Ohio "Precision Pilot" . . . a raised ring around the threaded area which makes feeding the nuts into components faster and more accurate in both hand and hopper fed operations. The pilot's diameter is designed to fit in the smallest hole providing maximum strength because the sheet is not weakened with oversized perforations. The pilot also provides extra thread depth for additional strength.

Per piece cost for Ohio XN nuts in the smaller sizes is lower than for other comparable weld fasteners and the new nuts enable other important savings by eliminating costly rejects and such extra processing as extruding and tapping and drilling and tapping.

Tests conducted by the Ohio Nut and Bolt Company have shown that the XN nut welds so securely that the metal of the parent part will rupture before the

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weld will break. Once welded in position, the XN provides a stronger, more durable bearing surface or threaded fastener opening.

Thread engagement of the XN nut complies with the Unified and American Screw Thread Standards and a wide variety of mating parts may be used with it. The XN nut is available in thread sizes 6-32 through 3/8-16 from stock.

High Strength Alloy

A new alloy of high tensile and yield strengths with high elongations and excellent castability was announced Aug. 27 by Reynolds Metals Company.

Designated alloy 357, it handles with all the ease of alloy 356 but develops considerably higher mechanical properties, according to R. P. Kytle, Jr., director of industrial products for Reynolds. Any foundry casting alloy 356 can handle the new 357 and obtain properties generally associated with alloys of higher price that are more difficult to cast, Mr. Kytle said.

The following typical permanent mold T-6 properties were listed for alloy 357: Tensile strength, 48,000 to 50,000 PSI; Yield strength, 35,000 to 37,000 PSI; Elongation, 6 to 10 per cent.

Stud Driver

A powder actuated, gun type stud driver, developed by the Engineer Research and Development Laboratories and Ramset Division, Olin Industries, Inc., makes possible the rapid attachment of special explosive charges on steel, wood, or concrete surfaces. It is designed primarily for attaching canvas bags containing explosive charges to the surface of structures that would normally be encountered in demolition missions.

The gun is a repeated type enabling the operator to make ten separate fastenings by firing ten shots without reloading. Special cartridges of .38 caliber provide the force required for the penetration and anchoring of the projectile or stud. The device will operate when held in any position, vertical or horizontal, and modifications have been made to permit its use under water up to depths of 20 feet.

The "Ramset Tool," as it is nicknamed, has a safety feature in that the gun barrel must be depressed to a predetermined position before it can be fired. The barrel is depressed by shoving it against the surface into which the fastener is to be placed. This operation also positions a spall shield to protect the operator from flying fragments when the cartridge is fired.

When the studs are fired into wood or thin metal plates it is necessary to use washers to prevent complete penetration. The washers are placed in an adaptor and are positioned against a shoulder of the stud when the fastening is made. These washers also provide a more secure fastening of the canvas bag or strap that is being attached.

Wet Adherence

A new method for determining the wet adherence of supported films to various bases has been worked out by Arthur S. Diamond of Kodak Research Laboratories.

The method provides a simple and precise means of measuring wet adherence or abrasion resistance of various coatings.

Diamond said that while the technique has so far been used only with emulsions applied to photographic film and paper, it could also be valuable in measuring a variety of coating materials and coated products such as paints, organic coatings, protective and decorative papers, plastics and textiles. It was developed in the paper service division of Kodak Park Works.

He explained that his method employs a pebble mill, charged with a specified amount of pebbles and fine quartz abrasive in water. A certain number of exposed film or paper samples are placed in the mill and abraded for several minutes, he said.

The samples are then placed in an optical densitometer to determine photometrically the percent of emulsion area removed. This quantity is termed the "coefficient of abrasion," a measure of the wet abrasion resistance of the sample.

Diamond pointed out major advantages of the test. It provides a numerical rating based upon a physical measurement. Sensitivity can be varied readily by altering one or more of the mill conditions such as the milling time, liquid volume, or amount of abrasive charged.

Diamond noted the test conditions can be easily standardized and operator variability virtually eliminated. Only a small sample is required, and the test can be performed quickly with readily available equipment, he said.

Literature

Metal Lathing

A complimentary 20-page booklet entitled, "Specifications for Metal Lathing and Furring," may be obtained by writing to the Metal Lath Manufacturers Association, Engineers Building, Cleveland, Ohio.

Technical points referred to in this valuable booklet include: specifications for solid and hollow partitions; wall furring; metal lath attached directly to wood supports; contact, furred, and suspended ceilings; beam and column protection for fireproofing; and reinforcing for exterior stucco.

In addition to descriptive tables summarizing the various spans and spacings for supporting metal lath and plaster ceilings, the 1958 "Specs" include a page devoted to fire-resistive ratings.

Vinyl-aluminum Coating

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aluminum protective coating, is contained in a new brochure entitled "Stran-Steel Buildings in Factory-Applied Stran-Satin Color."

A handy color guide in the brochure enables you to visualize the design possibilities and color combinations that can be used on different types of industrial, commercial and farm buildings. The six metallic colors of blue, rose, green, bronze, white and gray are shown. Weather durability, long life and low cost are clearly explained.

The brochure is available free from Stran-Steel Corporation, Detroit 29, Michigan.

Thermal Relief Valve

A new data sheet containing detailed information and specifications for the new, leakproof miniature thermal relief valve, has been published by the Fluid Regulators Corporation, designers and manufacturers of hydraulic and fuel valves.

The small-sized, lightweight unit relieves excess pressures caused by thermal expansion of fluids in a closed system.

The valve provides trouble-free operation with long life and has accurate response to pressure variations. The standard valve has no external leakage at 20 psi. External leakage is zero at all pressures. Cracking pressure is 30 ± 4 psi. Capacity is 3.5 gpm. Temperature range $-65°$ to $+280°$ F. Weight is under one ounce.

Free copies of the data sheet may be obtained from Fluid Regulators Corp., 313 Gillette Street, Painesville, Ohio.

Gravity Conveyor

New 16-page brochure describing the Rapid-Wheel Gravity Conveyor has been released by The Rapids-Standard Co., Inc. of Grand Rapids, Mich., makers of the complete Rapistan line of conveyors, casters and wheels.

The bulletin, RW-58, deals with various applications to which gravity wheel conveyors have been adapted. Making use of pictures, drawings, diagrams and specification tables, the brochure is easily understood.

Among other topics, the bulletin deals with selection of conveyors, construction features and accessories which are available for conveyor adaptations.

For further information regarding the brochure, write The Rapids-Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids 2, Mich. Ask for bulletin RW-58.

Detachment Too Great a Luxury

Detachment from human affairs is a luxury that scientists can no longer afford. So says Dr. B. D. Thomas, president of Battelle Memorial Institute, Columbus, Ohio, in an article outlining the position of the scientist in contemporary society. Writing in the September issue of the *Battelle Technical Review*, he reminds his fellow scientists that "the technical man has been drawn into the stream of human events by the circumstances of the last two decades in such a way that he has become the custodian of much of civilization."

The research administrator says of scientists: "We have often kept ourselves aloof from those human matters where logic and objectivity seem to have little part and where prejudice and circumstance seem to be in control. We have been content to stand by and see decisions made affecting the lives of all of us, made sometimes by men with no real knowledge of what they were doing or concern for the consequences of their action. The time for this detachment has passed.

"There are men on earth today," the Battelle executive points out, "who know all that is needed to be known to build a space ship to take us to the moon or the planets. There are also men," he warns, "who know all that is needed to be known to make the earth uninhabitable by human beings."

In taking a more active part in human affairs, Dr. Thomas says that scientists must overcome the "disdain" in which they are often held in the public mind. "Even those who are very willing to accept the material benefits derived from applications of science," he writes, "are often quick to suspect and condemn the source . . . We can note an anti-intellectualism in the so-called 'common man'."

Three Points

Describing a philosophy of action for scientists, Dr. Thomas discusses three important points:

"First, if we are to be the interpreters of science to the rest of mankind, we must understand and respect our science. We must recognize our part—our responsibility as the custodian at this particular moment of that legacy of knowledge that we have received from the past and that we are duty-bound to pass on to others. We must remember, as Spencer says, that we are descendants of the past, and parents of the future."

A second point in a scientist's philosophy is "concerned with the fact that as human beings we cannot afford to look with disinterest on anything that degrades our fellow man . . . We can afford to be patient with the social experimentation that seems to be going on in the world today. But we must not ignore the interest of our fellow man. It is a good criterion to use, for instance, in the field of education. The essential difficulty with our education today is that it is directed toward mediocrity. Through a misguided attempt to serve the democratic principle of equal rights for all, we have merely succeeded in reducing educational standards to the near-vanishing point. Because we know and understand something about the need for educated men and women in the world today, we must accept the responsibility for doing something about this problem."

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The final point advanced by the Battelle scientist is that "the scientist must always be concerned with the rights of the individual." "Science," he says, "for all that it is completely democratic, is essentially the concern of the individual." The ideal of freedom should be part of the personal philosophy of every scientist and engineer, according to Dr. Thomas. "Some may say that it should be part of the personal philosophy of every American, which is, of course, true. But it applies even more to scientists . . . Unfortunately, there is abundant evidence that many Americans, perhaps the majority, do not appreciate or understand the personal freedom they enjoy."

Dr. Thomas concludes that "scientists have great responsibilities in guarding our civilization. They must take a larger part in holding standards high, not only in science and technology, but in every facet of life."

Study Team Visits Russian Factories

A 13 man study team of engineers left New York for Moscow on Aug. 16 to inspect Russian automatic factories and research institutes where automatic control devices are developed. After their 18 day tour they were to report to engineering and scientific groups in the United States.

Their itinerary included plants in Moscow, Leningrad and L'vov as well as the Central Technical Institute, Moscow, a leading center of Soviet Research and Development in Automatic Control. The group, sponsored by American Automatic Control Council and The American Society of Mechanical Engineers, represented, in addition, professional divisions of the American Institute of Electrical Engineers, American Institute of Chemical Engineers, Institute of Radio Engineers and the Instrument Society of America. Delegates included some of the nation's leading experts in the field of automatic control.

The delegation made the trip at the invitation of the USSR Academy of Sciences and the Government Learned Technical Committee, representing 12 Russian engineering societies. The tour, initiated by ASME, was part of the technical exchange program agreed upon by the U.S. and Russian governments.

The delegation, under the leadership of William E. Vannah, editor of *Control Engineering*, McGraw-Hill publication, will report its findings to the U.S. engineering community at a series of professional meetings.

On his return trip, Vannah was scheduled to address the Norwegian Institute of Technology and compare control technology in Russia and the United States.

Other members of the delegation were: J. H. Felker, manager of special systems engineering, Bell Telephone Labs, New York; Herbert Ziebolz, assistant vice president of engineering, General Precision Equipment, New York; George Newton, professor of electrical engineering, Massachusetts Institute of Technology; Philip Sprague, president, Hays Corporation, Michigan City, Indiana, and Harry W. Mergler, professor of mechanical engineering, Case Institute of Technology, Cleveland.

Also, S. W. Herwald, manager, Air Arm Division, Westinghouse Electric Corporation, Baltimore; E. M. Grabbe, senior scientist, Computers Systems Division, Thompson-Ramo-Wooldridge, Los Angeles; E. P. Epler, head of reactor controls, Oak Ridge National Laboratory; R. J. Kochenburger, head of electrical engineering department, University of Connecticut; N. Cohn, manager of market planning, Leeds & Northrup Company, Philadelphia; Ralph Palmer, chief engineer, Data Processing Division, IBM, White Plains, New York; and Edward J. Kelly, research engineer, Lincoln Laboratory, MIT.

Members of the delegation were scheduled to report on what they observed at open meetings of the Instrument Society of America at Philadelphia in September, the American Institute of Electrical Engineers at Pittsburgh in October and the Annual Meeting of The American Society of Mechanical Engineers to be held in New York December 1-5. Reports will also be published in American technical publications.

Clary Dynamics Div. Gets Valve Contract

Clary Dynamics Division of Clary Corporation has received a contract from The Martin Company, Denver Division, for development and production of propellant valves, Paul J. Meeks, Clary Dynamics president has reported from San Gabriel, Calif.

The propulsion-system valves are for use in the USAF Titan, the Martin-developed Air Force intercontinental ballistic missile. Deliveries to the Martin-Denver plant are scheduled to begin this fall.

Clary Dynamics is a major manufacturer and designer of valves, servo-actuators and gyroscopes for guided missiles and aircraft.

Instrumentiers Meet

The Instrument Society of America held its October 6 meeting at Vogel's Restaurant, 1250 Indianapolis Blvd., Whiting, Indiana. This was a joint meeting of the Northern Indiana and Chicago Sections of the Instrument Society at which the speaker was to be Henry C. Frost, Assistant Chief Engineer, Corn Products Refining Company. Mr. Frost spoke on "Challenges in the Expansion of Process Instrumentation."

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ASCE Sections Meet Jointly

An international review of structural engineering developments will feature the national convention of the American Society of Civil Engineers in New York City, Oct. 13-17.

The Convention will provide a setting for a joint meeting of ASCE's Structural, Engineering Mechanics and Construction Divisions and the International Association for Bridge and Structural Engineering, at which the most recent advances in structural design, research in the behavior of structures and properties of materials, and construction techniques will be discussed in eight half-day sessions.

Thirteen European engineers, representing eight countries, and 14 American engineers will be on the program, which has been arranged to give a well-rounded picture of recent advances and probable future trends in structural engineering, as well as presenting the most advanced current research and practice.

Special attention is given in the program to current trends in design of both steel and concrete structures. The plastic method of design of steel structures will be discussed in several papers, and reports on investigations of the effect of ductility, creep and fatigue will be given. Other papers are concerned with problems of stability, the design and performance of suspension bridges, fire protection, and fabrication and erection problems.

In the field of concrete, emphasis is on ultimate strength and limit design, prestressed concrete, folded plate structures and shells. The design of arch dams will be discussed in two papers, and other topics will include model tests, fire research, and the use of electronic computers.

Earthquake, blast and other dynamic effects in both steel and concrete structures will also be considered.

All the European and many of the American speakers are members of the International Association for Bridge and Structural Engineering, which promotes collaboration between scientists and engineers of different countries and provides a means for the exchange of ideas, theoretical and practical knowledge, and the results of research.

The meeting has been made possible by a grant from the National Science Foundation and other contributions from organizations and individuals, as tributes to the national and international leadership of ASCE and IABSE in the civil engineering profession.

Germany Appreciates The Peacetime Atom

Germany's intense interest in the atom for peacetime uses was demonstrated in New York on July 10 by a shipment of American-made fuel elements and reactor components from Idlewild International Airport. The consignment was destined for use in the first research reactor built in Europe expressly for the development of nuclear propulsion systems for oceangoing vessels.

Dr. E. Hess, German Embassy scientific attache, took custody of the shipment at the airport on behalf of the German Government from a representative of the U. S. Atomic Energy Commission. Ben F. Olson, assistant export manager of The Babcock & Wilcox Company, manufacturers of the reactor as well as the fuel elements, previously had turned the cargo over to the AEC.

Included in the shipment were 43 fuel elements and two fission chambers. The latter translate nuclear fission into electrical impulses for neutron-counting purposes.

The consignment will be presented by the German Government to The Society for the Utilization of Nuclear Energy in Shipbuilding and Navigation, Inc., which will operate the experimental reactor at a site 20 miles from Hamburg.

The reactor will be of the "pool" type, in which the core of fuel elements is immersed in a pool of water for cooling and shielding purposes, and to slow neutrons to useful velocities. Unique in that it will have four pools, the reactor is expected to sustain a controlled nuclear chain reaction in October of this year.

A feature of President Eisenhower's "Atoms for Peace" program, the reactor will utilize fuel elements containing 20 per cent enriched uranium-235, the maximum concentration usually permitted for shipment abroad by provisions of the program. The fuel elements, which were made at B&W's fuel element plant in Lynchburg, Va., are of the flat-plate type and utilize an alloy consisting of alumnum and 45 per cent uranium by weight. B&W, prime contractor for the nuclear propulsion system for the N. S. *Savannah*, world's first atomic merchant vessel, is the only manufacturer in the U. S. turning out this type of fuel element.

The cargo was flown to Germany by KLM Royal Dutch Airlines.

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U.S. Air Pollution Attitude Changes

A radical change in the nation's attitude toward air pollution was documented Aug. 29 on the fifth anniversary of *Smog News,* a semi-monthly publication of The American Society of Mechanical Engineers. During the past five years, said the newsletter's editor, emphasis has shifted from relatively simple problems such as smoke and fly ash to the much more complex problems usually associated with the word "smog." In addition, more cities have become concerned with air pollution and control budgets have grown enormously.

The review of developments in the field on air pollution was issued by Frederick S. Mallette, secretary of the Air Pollution Control Committee of ASME and editor of *Smog News.*

"In contrast to the simple problems of smoke and fly ash dealt with in *Smog News* five years ago we now find news items on a wide variety of problems, from automobile exhausts to odor meters," said Mallette. At that time, only Los Angeles was then worrying about "smog" which had come to mean a complex mixture of air pollutants rather than a mixture of "smoke" and "fog," its original definition. Today, concern over air pollution is no longer limited to a few cities. There is hardly a town of any importance which does not have an active interest in air pollution.

Practically every state in the Union and Hawaii are represented by state health department activity. Mallette said, "Air pollution budgets today are important municipal expenses with Los Angeles County topping the list at almost $4,000,000 per year. New York City spends approximately $670,000, the San Francisco Bay Area almost half a million dollars, and the California State Department of Health over $350,000. Expenditures by industry for control measures, as shown in *Smog News,* are also staggering with a recent report of $12,000,000 for just one plant of a large steel company. Sums in the vicinity of $50,000 for incinerator or odor problems are found frequently."

In its present form, *Smog News* covers a wide variety of air pollution problems. It features reproductions of news clippings about industrial pollution, agricultural damage, incinerator and odor problems and related subjects.

The newsletter began as an information bulletin for members of the ASME Air Pollution Control Committee. Within a few months, so many requests for it were received that the mailing list grew from its original size of forty to hundreds. The committee then offered the magazine on a subscription basis.

Computer Contract Goes to Data Corp.

A $600,000 contract for a large-scale computer of advanced design has been awarded by the U. S. Navy Bureau of Ships to Control Data Corporation, Minneapolis computer and control firm, William C. Norris, president, has announced.

It was the first customer order for the company's CDC 1604, a high-speed scientific computer which has been under development since the young company was organized a year ago. The new contract, plus another $600,000 in missile component contracts received in June, has boosted Control Data's backlog to $2,000,000, more than three times what it was at the beginning of this year, Norris said.

Other contracts include a quarter-million dollar production order for guidance system components from Lear Inc. for the Bomarc program and orders for components for the Sparrow and Hawk missiles being produced by Raytheon Manufacturing Company.

Construction of the first CDC 1604, which will be used by Control Data engineers, is in progress and building of a second computer for the Navy will begin immediately. The Navy will install the new computer at the Navy Post Graduate School, Monterey, Calif., where it will be applied to complex problems of naval warfare.

Basic elements of the electronic brain are transistorized "building blocks" of a new and advanced design. More than 7,000 of the building-block cards, which measure 2⅛ inches by 2½ inches, will be used in each 1604.

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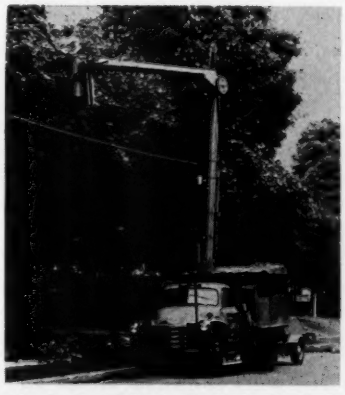

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C-6996 QUALITY CONTROL ENGR. Grad. EE, Electronic option. Duties: All work will be in quality control, but most essential is electronics training. Should have exper. in the design & construction of industrial electronic apparatus involving circuit analysis, manufacturing determinations, reliability & testing, sal. up to $10,000 dep. on exper. loc. So. Wis.

C-6998 SALES ENGR. ME age 28-38; 4 yrs. exper. selling to builders & users of large engines, compressors, turbines & machinery, know oil filtering & oiling systems. Duties: Traveling 60-70% of the time selling liquid filters, strainers, etc., car req'd. for a mfgrer. sal. $600 or more dep. on exper. hdqrs. Northern Suburb of Chgo., employer will negotiate the fee.

C-7000A SUPERVISORY CIVIL ENGR. (ESTIMATES) GS-12 BS degree in engrg. from accredited college or equiv. in exper. 3½ yrs. of professional engrg. exper. of which at least one year must have been specialized progressive prof. exper. with particular emphasis on estimating. Duties: As asst. chief to estimates section Engrg. Div., make assignments & review completed tech. work involving detailed estimating of labor, materials & eqpt. req'd. in multi-storied bldgs., tech. bldgs., locks & dams, bridges & other structures leading to their construction for activities. Also review & check cost estimates prepared by Arch.-Engrg. firms for a Gov't. Agency sal. $8810, employer will pay the fee.

C-7007 DESIGNER CE, AE or Equal age to 35; 2 yrs. exper. pref. know indeterminate structures—must have interest here. Duties: Structural design & devel. of steel bldg. frames. Also structural & architectural design of all types of bldgs. & bridges for an Arch.-Engrg. firm sal. to $700 loc. Ill. employer will negotiate the fee.

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906-MW: STRUCTURAL DESIGNER MSCE 30; 5 yrs. exper. structural design for bldgs. Registered professional engr. loc. open.

905-MW: PLANT ENGRG. 34 BSME, good background in plant engrg., new construction, machine design, preventive maint., cost control & supv.

902-MW: CHIEF ENGR. CHIEF TRANSMISSION ENGR. SALES ENGR. EE & CE 48; 15 yrs. exper. in elect. power transmission & distr. design, location & constr. Expert in elect. transmission lines new design, remedial design, conversion, bundled conductor & vibration problems. Exper. in alum. elect. cable & bus bar design & product devel. Exper. in sales consulting engrg. personnel.

Executives Make Use of STOL

Executives of the Bettinger Corp., Waltham, Mass., recently demonstrated how STOL (Short Take Off and Landing) aircraft can save time in their busy schedules. The test, a flight in an airplane which can take off in a distance of 75 feet, made possible a trip that could not have otherwise occurred.

Robert A. Weaver, Jr. president of the Bettinger Corp. took part in a test at the Weston Golf Club which vividly demonstrated the time-saving characteristics of STOL aircraft. Following a meeting by executives of the company with a representative of U.S. Steel at the Weston Golf Club, Mr. Weaver and Mr. Robert Ritchey, in charge of product development for U.S. Steel Corp., flew in a Helio-plane to the company's Rehoboth plant.

Following the meeting, Weaver and Ritchey boarded a plane belonging to the Helio Aircraft Corp. of Norwood, Mass., which was waiting for them on the first fairway of the golf course.

A few moments later the Helio-plane took off, using only 75 feet of fairway. It touched down on a hay field near Bettinger's Rehoboth plant. Weaver and Ritchey then resumed their discussion following a tour of the plant.

Bettinger Corp. manufactures a number of products utilizing the principle of ceramic-on-steel. The Rehoboth plant manufactures ceramic-on-steel tile marketed under the name of Starfire Tile.

Weaver pointed out that the use of the Helio-plane had substantially reduced the amount of time necessary to move from the Weston Golf Club to the Rehoboth plant. "I don't think that we would have been able to carry on quite as resultful a meeting with Mr. Ritchey if we had not been able to get to the plant to show him what was going on there. Naturally, we could not have made the trip without the Helio-plane."

Bettinger's use of this novel method of transportation is part of a continuing effort to discover new ways to increase executive efficiency. Recognizing the tremendous demands made on the time of its executives, the firm is continually looking for new methods of saving time. The use of STOL aircraft is being tested as one possible device for cutting down the amount of time Bettinger executives lose in traveling between points not served by conventional airlines and airport facilities and between plant sites.

Accompanying Ritchey and Weaver was Mr. Nathaniel Cannistraro, vice-president for sales and marketing of Bettinger Corp.

Further tests of this type will be conducted to determine the ultimate possibility of this new device.

Safety in Timber is Conference Subject

The factor of safety in timber construction occupied the attention of the engineers attending a convention session of the American Society of Civil Engineers on June 23 in Portland, Ore.

Lyman W. Wood, engineer, of the U. S. Forest Products Laboratory, Madison, Wis., told the visiting engineers that the factor of safety in structural materials is almost "a factor of ignorance."

Reminding his audience that timber engineers are naturally concerned with the safety of the structures they design, and that safety is the primary objective of building codes and the first duty of the building official, Mr. Wood commented:

"What is a factor of safety? A material may have an average strength value of 10,000 pounds per square inch, and may be used with a design stress of 2,000 pounds per square inch. Superficially, it might be said that there is a factor of safety of five, yet this is generally not true.

"Much of the reduction to the design-stress level may be necessary to convert from the conditions of laboratory test to those of structural use. That part of the reduction does not produce a margin of safety.

"It seems more reasonable to think of the factor of safety as a provision for something beyond the foreseeable conditions of structural use. The factor of safety is almost a factor of ignorance."

Mr. Wood said that a few major and many minor factors affect safety in timber design. Among the major factors are the strength of clear wood, the duration of load, and the presence of "defects."

The strength of clear wood, he added, is not always the same. Clear wood has a normal variability among trees or among pieces of lumber from the same tree.

Regarding duration of load, he said that it has been found the average timber has a factor of safety of about 2¼, or 2¼ times the strength value, for long-time loading, but for a few minutes will show a factor of safety of 4.

Cleveland Center is Formally Dedicated

Formal Dedication Ceremonies for the new Cleveland Engineering & Scientific Center, 3100 Chester Avenue, Cleveland, Ohio, were held September 4-7.

The Center, owned and operated by the Cleveland Engineering Society has been open for summer activities since July 15, but the Dedication marked the beginning of full scale operations. The new building, the first of its kind in the country, is designed to center engineering and science in all its phases under one professional roof.

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WSE Applications

In accordance with Article I, Section 5 of the By-Laws of the Western Society of Engineers, there is published below a list of applicants for admission received since the last issue of the Midwest Engineer *magazine.*

Frank E. Seery, Assist. Vice President, General American Transportation Corp., 135 S. LaSalle St.

Lester Templeton, Jr., Associate Chemical Engr., Armour Research Foundation, 10 W. 35th St.

Ulrich G. Naef, Engineering Chemist, City of Chicago, 1633 Medill Av.

Albert E. Berg, Jr., Contracting Engr., Vacudyne Corp., 14419 S. Torrence Av.

Modern Statistical Methods Called For

Full use should be made of modern statistical methods to complement, not replace engineering and chemical principles to obtain effective prediction from chemical experimentation, it was emphasized in Montreal, Quebec on Apr. 21 during the Canada-United States Chemical Engineering Conference, sponsored by the American Institute of Chemical Engineers and the Chemical Institute of Canada.

This advice was given by S. L. Andersen, of E. I. Du Pont de Nemours & Co., Wilmington, Del., in a paper, "The Role of Statistics in the Strategy of Chemical Experiments."

"The aim of most chemical investigations," he said, "is to predict the behavior of a process or the properties of a product. An effective experiment is one which results in the broadest possible reliable predictions from a specified amount of experimental effort. Therefore, statistical methods play a role in the strategy of experimentation to the extent that they aid in this effectiveness."

Andersen said that statisticians "must not substitute as a basis for quantative measurement a blind adherence to elaborate statistical schemes, such as latin squares, composite rotatable designs and the like. These tools are extremely useful, but they are not the basis or cornerstone of our conceptual thinking about the system under study.

"This basis must be supplied by the chemist or engineer conducting the investigation. However, to capitalize on the knowledge of the system, the engineer must seek the new methods which specify efficient designs for and pertinent analysis of data at each step of his experimental program. He must use the science of experimental strategy, statistics, which is a more powerful catalyst than experience, and intuition in obtaining a high yield of pertinent information from engineering principles and experimental budgets."

Boiling Water Is "Investigated"

What happens to water that is heated within a boiling water nuclear reactor—how it circulates—is being investigated by scientists at the Argonne National Laboratory, Lemont, Ill.

Dr. Paul A. Lottes of the Argonne Reactor Engineering Division reported Sept. 12 that these experiments can be extrapolated to show that large gains in power density can be realized by the proper design of very high pressure boiling water nuclear reactors.

His paper was presented at the Second International Conference on the Peaceful Uses of Atomic Energy at Geneva, Switzerland. Co-authors of the paper are John F. Marchaterre, Raymond Viskanta, and Dr. Joseph A. Thie, Dr. Michael Petrick, Robert J. Weatherhead, and Barton M. Hoglund, of the Argonne Reactor Engineering Division; and W. S. Flinn of the firm Combustion Engineering, Windsor, Connecticut.

A boiling water reactor is a nuclear reactor, or "atomic furnace," in which water is brought to a boil in a vessel surrounding a core of nuclear fuel. Steam from this water may be used to heat water in another system which powers a turbine; or the steam may be fed directly into a power-producing turbine.

A direct cycle boiling water reactor is one in which steam generated in the reactor vessel directly powers a turbine. The Experimental Boiling Water Reactor at the Argonne National Laboratory is a direct cycle reactor. To find out how water would behave in this and other boiling water reactors, scientists heated water electrically and then fed it through a natural circulation system. Such a "natural" system does not use pumps.

The usefulness of the experiments, Dr. Lottes stated, lies in the fact that simplified equations were evolved to show the reactor designer how to calculate the behavior of a boiling water reactor nuclear power plant. The equations were verified by observations from experimental systems. These tests covered natural circulation boiling at pressures as high as 600 pounds per square inch and heat power densities up to 95 kilowatts per liter of water. Densities of steam and water in natural circulation systems and the friction of steam and water in these systems were studied.

Long Tunnel

Germany's longest vehicle tunnel, opened to traffic recently, started in 1941 as a giant air-raid shelter for the city of Stuttgart, reports *Engineering News-Record*. After the war , the city council decided to extend one of the two bores. They spent three million dollars to make the 3,000-foot-long, 25-foot-wide two-lane tube, cutting through a hill in the city.

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Metal Powder Strip is Reality

Major problems of producing high-quality hot rolled strip from metal powder have now been solved, and commercial production of copper strip from metal powder will soon be a reality. While most development work has been in copper, the system has shown practical application to many other metal producers, and experimental work on nickel shows much promise.

The economic implications of this are great, for it is possible to produce high quality hot-rolled strip from powder at savings of about 20 per cent of conventional equipment and rolling costs.

The E. W. Bliss Company, developer of the process in conjunction with the Chemetals Corporation of New York City and others, has announced that its own tests, tests run by a major producer of copper products, and the findings of independent testing laboratories, reveal these facts:

- Copper strip produced from powder has higher mechanical properties than electrolytic grade copper strip produced by conventional methods.
- The oxygen content is substantially lower in strip produced from powder than in electrolytic grade strip.

Production of this high-quality copper strip follows more than six years of research at the Bliss Company's pilot sintering line at Salem, Ohio, where, in cooperation with the Chemetals Corporation, of New York City, patent holder and licensors of the process, equipment to make commercial production feasible has been perfected.

The process begins with chemical production of metal powder from various sources—cements from mining pits, scrap, ores and concentrates and others. The powder is then fed through a hopper and guide arrangement through a mill for green compacting, and is passed continuously into a protective atmosphere heating furnace for sintering. On delivery from the furnace it is immediately hot-rolled, with further reduction or reductions. Then, depending on the material, it may be sintered and hot rolled again to produce metal completely consolidated to 100 per cent density.

Many production problems had to be solved during the course of the experimental program. For example, special rolls and feed devices had to be developed before it was possible to produce green compact of uniform thickness and density, with edges that were extremely uniform, sound and square.

And much research had to be done in the fields of protective atmosphere, sintering time and sintering temperatures.

The end result of all this research, however, is metal strip comparable or superior to conventionally-produced strip. The powder metal copper coils used in the tests to be described were 0.040 inch gage, six inches wide, and 100 to 200 pounds in weight. After production by the powder metal process, they were annealed and cold rolled to 0.010″ on a conventional four-high rolling mill, and were cold-rolled without edge cracks or other difficulty. After cold rolling, they were again annealed.

Underwater Weapon System is Developed

A new underwater weapon system that employs a wire-guided torpedo designated the Mark 39 has been developed for the Navy's Bureau of Ordnance by Vitro Laboratories, Silver Spring, Md., according to a joint Navy-Vitro announcement.

The Mark 39 resembles a conventional torpedo, but is actually an underwater guided missile capable of tracking and destroying its target despite countermeasures and evasive action. The weapon is connected to its launching vessel by a wire that is paid out, spider-like, from the torpedo as it drives through the water. Operators aboard the launching vessel send electrical signals over the wire to guide the torpedo to a "kill."

The range of this new underwater weapon was not disclosed.

The wire technology, torpedo, and director were developed into a weapon system by Vitro Laboratories, Silver Spring, Md., a division of Vitro Corporation of America. The directors were manufactured by Vitro and the torpedoes by Philco Corporation.

The Bureau of Ordnance recognized Vitro's achievements in torpedo and guided missile systems by presenting the Silver Spring Laboratory the Naval Ordnance Development Award in 1957.

Hires "Over Forties"

In San Gabriel, Calif. there is one company which not only doesn't object to hiring "over forties," but actively seeks them.

Clary Corporation, a business machines manufacturer, has sent a memo to its national branch offices urging them to look up the "Over 40 Club" in its area to fill new sales territories.

"This club consists of men who have held good positions in industry," the memo states, "but for one reason or another are out of work and find it hard to make new connections because of their age."

It cites the following reasons the company prefers the "40-plusers":

"The older men are more inclined to be permanent.

"Most of them own their own homes and have resisted transfers to other cities.

"They take less supervision as they have lived long enough to know that everyone must work hard in order to make a living."

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Dresden Station is 50% Complete

The Dresden Nuclear Power Station, America's first large boiling water reactor plant, is over 50 per cent complete, R. D. Maxson, MWSE, senior consulting engineer, Commonwealth Edison Co., reported at the Second United Nations Conference on Peaceful Uses of Atomic Energy at Geneva, Switzerland, on Sept. 4.

Maxson was a member of a panel discussing the power reactor development program in the United States. Prior to the panel discussion, Dr. Norman Hilberry, director of Argonne National Laboratory, Lemont, Ill. presented a major paper outlining progress in this field.

The Dresden plant, a 180,000 kilowatt all-nuclear unit located 50 miles southwest of Chicago, is being financed entirely by private industry, Maxson pointed out. "Associated with Commonwealth Edison in financing the plant is the Nuclear Power Group, Inc., a group of seven utility companies and one engineer-constructor organization," the Edison engineer explained. The seven utility companies represent an estimated 15 to 20 per cent of United States generating capacity, Maxson added.

Research and development, and design and engineering phases of the station, are essentially completed, delegates were told. "The 190-foot sphere housing the reactor and auxiliary equipment was completed and successfully tested last March, Maxson reported, and components of the nuclear steam supply, such as secondary steam generators, steam drum, emergency condenser, and stainless steel process piping are now being installed."

Feedwater heaters, feedwater pumps, condenser, and other auxiliary equipment in the turbine building have been completed. Construction of the waste tank farm is under way.

"Target completion date is the end of 1959, with critical tests and low power operation scheduled shortly thereafter; power operation is scheduled for mid-1960," the Edison engineer reported.

Training of station operating personnel has been under way during the last year.

The plant is being designed and constructed by General Electric Co. for a fixed contract price of $45,000,000, Maxson said. "Not including as a plant cost the $15,000,000 in research contributions by Nuclear Power Group, Inc., the plant will ultimately produce power at a cost, based on the capitalized value of the plant, operating expenses, and nuclear fuels, of about ¾ of a cent per kilowatt hour," Maxson reported.

"This is about the same as power produced by Commonwealth Edison's newest coal-fired units," the Edison representative reported. "However," he added, "costs incurred by General Electric exceed the $45,000,000 contract price. If General Electric's additional costs, and the $15,000,000 of research and development contribution (not capitalized) are taken into account, the power cost would not be competitive."

The station will use a dual-cycle boiling water reactor. In this reactor system, the steam-water mixture produced in the reactor core flows from the reactor vessel to a primary steam drum essentially at reactor pressure of 1,000 psi. The steam then flows to the turbine through the primary steam lines and the water is led to the secondary steam generators, where additional energy is removed to produce steam at a lower pressure of approximately 500 psi. This secondary steam is admitted at a lower stage of the turbine.

General Electric has complete "turnkey" responsibility for the project, and also is responsible for fuel loading and start-up of the reactor. The firm will operate the reactor during the testing and demonstration period.

Civil, structural, mechanical, and a major portion of the electrical work is being done by the Bechtel Corp.

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ORIGINATORS OF DROP CROTCH AND LATERAL METHOD OF TRIMMING

Russians Would Use The Force of Ideas

If the Russians should attempt to dominate the world, they will seek to do it, not just militarily, not just economically, but rather by the force of ideas.

That is a dominant fact Americans must keep in mind in planning national strategy, Dr. Charles N. Kimball, president of Midwest Research Institute, declared July 31 in Kansas City, Mo., in the Institute's 13th Annual Report.

"What would the world's reaction be, for example, if Russian scientists suddenly were to announce specific remedies for cancer or heart disease?" he asked. "What would this do to the prestige of the United States in underdeveloped countries, whose people now view Russia as a militaristic nation and the United States as a humanitarian nation?"

Another dominant fact, Dr. Kimball said, is that man has achieved through science a power he has never known before. "The transition the world is undergoing — this scientific revolution — will relegate previous eras of great social change, such as the industrial revolution of the 1700's, to positions of minor historical significance. This is not just because of the extent of today's change. It is due more to the rate at which changes are taking place—almost daily."

Furthermore, Dr. Kimball said, the Soviets are determined to convert this scientific revolution into an economic revolution, which is another aspect of the Russian challenge to the free world.

In the light of these world conditions, he continued, American independent,

nonprofit research institutes such as MRI are playing an increasingly important part in the national interest. He described some of the Institute's current work in solid film lubricants, boron chemistry, operations research, economics, food technology, metal physics, mathematics, and engineering.

Dr. Kimball also reported on the first full year of the Institute's Basic Research Associates program, under which corporate, foundation, or individual members contribute to expanded basic research in the public interest. Such projects include a new high-speed classifying system for chemicals, the fundamentals of aging, study of the basic factors involved in the design of heart-lung machines for use during cardiac surgery, and a systematic search for chemical cures for cancer.

The total research volume of Midwest Research Institute in 1957 was $2,400,000. The cumulative total for the Institute's 13 years is $16,250,000. Last year MRI served 180 organizations (of which 57 were new sponsors), making the total sponsors to date 855. Work was conducted last year for organizations located in 28 states, the District of Columbia, and the province of Manitoba.

Radar Safety System

A radar safety system for cars may be on the market soon, reports *Electronics*. The radar antenna, part of the auto's front grillwork, will send out a radiation pattern. If the radar-equipped car approaches another car too fast, beeps will be produced by a tone generator mounted on the dashboard. The signal will get louder as the danger becomes greater.

Air Conditioners for Computers Discussed

New techniques to permit engineers to "air condition" computers and other electronic equipment more effectively were discussed Aug. 19, at an engineering conference in Chicago.

Electronic devices, it was explained, must be cooled in order to prevent vacuum tubes and transistors from generating so much heat that operation of the equipment would be affected.

Two papers attacking the problem of keeping weight of the cooling equipment low, especially for airborne electronic systems, and at the same time guaranteeing that temperatures will not become too great were presented at the second National Heat Transfer Conference and Exhibit at the Edgewater Beach Hotel. The conference was sponsored jointly by the American Society of Mechanical Engineers and the American Institute of Chemical Engineers.

Myron Goldberg, an engineer with the Air Armament Division of the Sperry Gyroscope Company, Great Neck, New York, outlined methods of predicting the temperatures that will be reached by vacuum tubes under various cooling conditions. A second paper by Allan D. Kraus, of the same company, described methods of predicting the amount of heat that can be dissipated from a transistor through the cap of the transistor itself. Even though transistors generate much less heat than vacuum tubes, the small surface available for carrying off the heat may cause severe temperature problems, the author said.

In 1957, 1,330 Americans were killed in train-car crashes.

53,000 Americans were injured in car-bicycle mishaps in 1957.

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Obituaries

Recently Western Society was notified of the death of Chester T. Dike on August 2, 1958. Mr. Dike, 86, was one of the Society's oldest living members. He entered the Society in 1901 and became a Life Member in 1938.

Mr. Dike was, until his retirement, connected with the Chicago & Northwestern Railroad and served as Vice President of that company. He had been living in California for the past several years.

* * *

On June 25, Don E. Marsh passed away. Mr. Marsh, 83, had been a member of Western Society since 1913 and attained life membership status in 1943.

He was, for a time, associated with the American Bridge Company. Later he entered into the formation of Winds-Marsh Engineering Co., city engineers for Glencoe, Highland Park, Hubbard Woods, Winnetka, Kenilworth, and Wilmette. In 1942 Mr. Marsh became Sanitary Engineer for the Rocky Mountain Arsenal at Denver, Colorado where he remained until his retirement in 1951.

Sincere condolences are expressed to the Marsh family on behalf of the membership of Western Society.

The *Enterprise* Uses Aluminum Bus Bar

The *Enterprise*, America's first atomic-powered aircraft carrier, will use 16,000 pounds of aluminum bus bar, pointing up the increasing use of aluminum conductor in naval vessels.

The 6101-T61 aluminum bus specified will be supplied by Reynolds Metals Company. It will be fabricated into switchgear and silver-plated at Newport News for installation on the atomic carrier, now under construction.

"We are gratified that aluminum bus was specified for this historic project," stated Neil W. Zundel, director of the transportation markets for Reynolds, "since it opens the way for increased use of this product in all types of shipbuilding."

The 6101 alloy, now used widely in bus conductor, was developed by the Reynolds metallurgical research laboratories primarily for this type of usage, according to Mr. Zundel.

"This alloy," he said, "offers a cost savings of approximately 50 percent compared with copper, as well as a 50 percent savings in weight."

Light weight, he pointed out, is an important factor in shipbuilding.

The 6101 alloy has high strength characteristics and relative high conductivity. Its lower cost is due to the fact that it can be extruded and heat treated.

Reynolds has pioneered a number of developments in the field of aluminum conductors, including the first commercially available silver-plated aluminum bus.

Sun Batteries May Find Wide 'Earth' Use

Research on sun batteries now used in satellites may result in their widespread use on earth, it was reported in Buffalo, N. Y., on June 26 at the Summer General Meeting of the American Institute of Electrical Engineers.

The possibility was envisioned by K. L. Niebauer, of the Boeing Airplane Company, Seattle, Wash., in a paper, "High Altitude — Performance of Silicone Cells."

Results of the test program, he said, "indicate that silicone solar cells can be used at extremely high altitudes and in space without experiencing damaging temperatures. . . . The solar converter has a definite place in the accessory power system (of missiles) of today, but its importance will increase with the advance in space vehicle design. It is possible that the use of the silicone solar cells for satellite vehicles will give the art the necessary impetus and lead to further breakthroughs which will eventually result in a solar converter that can effectively compete with more conventional power generation means for use in our everyday living."

Niebauer said that the use of solar converters to charge sealed nickel-cadmium batteries appears to be the most promising method of using the sun's energy at present and the conversion process will attain an efficiency approaching 15 per cent within the next few years.

IIT Gets Grant

A $14,369 grant has been awarded to Illinois Institute of Technology, Chicago, for a study of the basic processes by which light energy is transferred and utilized in liquids and solids.

Principal investigator in the U. S. Atomic Energy Commission project will be Dr. Leonard I. Grossweiner, associate professor of physics.

The one-year grant, which is part of a $25,000 IIT program, will utilize flash photolysis—an experimental method in which substances are irradiated with a short light flash equivalent to 50 million watts—to measure split-second changes in the optical absorption spectra.

Grossweiner explained that this process makes it possible to produce and identify unstable intermediates normally present in amounts too small for detection.

Specific materials to be investigated include dyes which exhibit flourescence when illuminated and certain inorganic crystals which become intensely colored when irradiated with x-rays.

Prior to his joining Illinois Tech, Grossweiner was an associate physicist at Argonne National Laboratory. He is the author of numerous papers and articles in his field.

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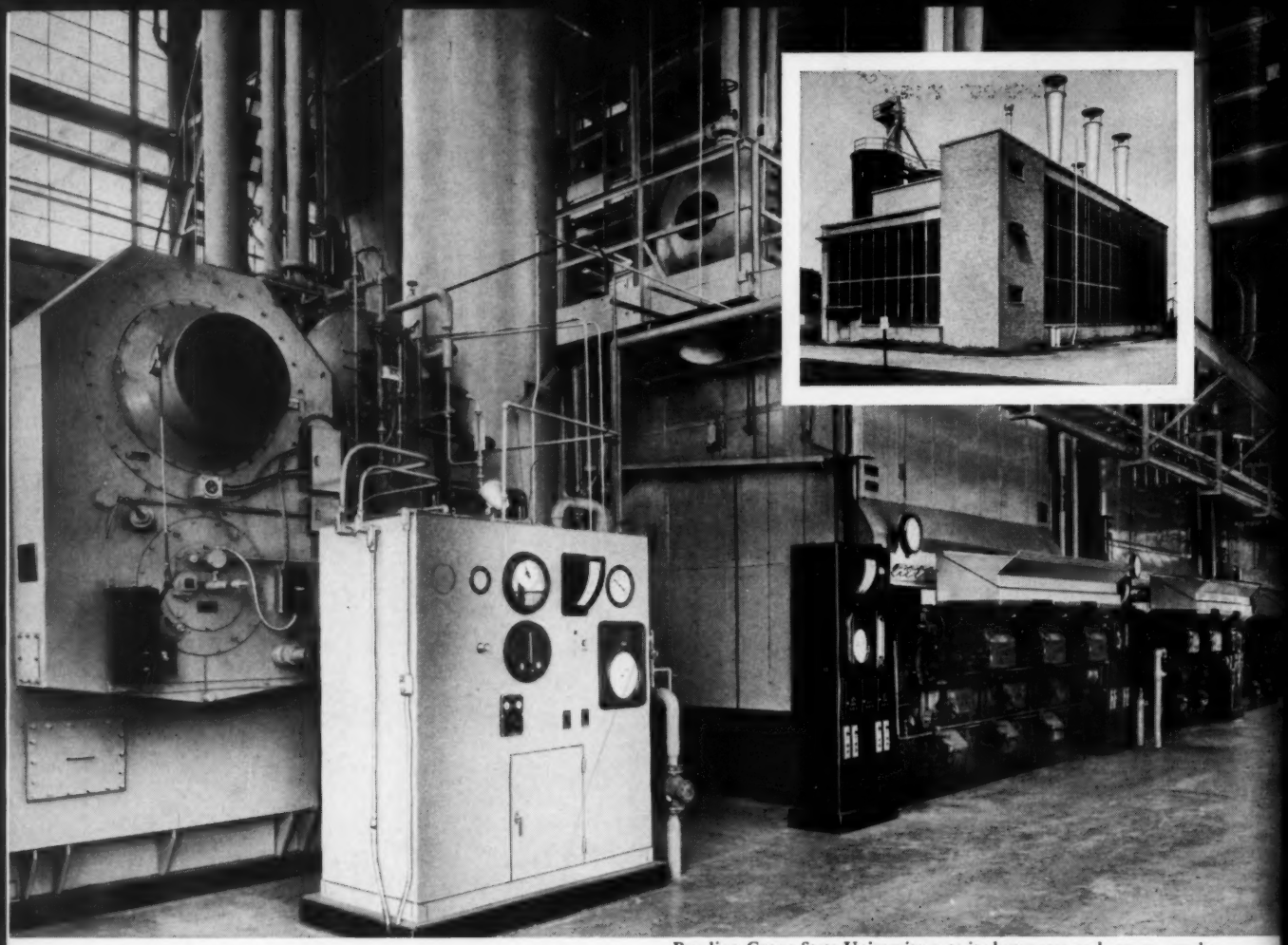

Bowling Green State University gets its hot water and steam supply from 4 B&W Integral Furnace Boilers in this modern power plant. Heating Contractor: John Paul Jones, Cary & Miller, Cleveland, Ohio.

B&W Boilers at Bowling Green University Operate on Low-Cost Coal, Cut Downtime

Reordering is a vote of confidence that occurs regularly for B&W. The Bowling Green State University steam plant is a case in point. In 1950-1951, B&W installed three stoker-fired, Integral Furnace Boilers to supply hot water for laundry, kitchens, hospital, bathrooms and the steam supply for entire campus. Their high performance has just led the University to specify and install a new natural-gas-burning Integral Furnace Boiler. Taking over during the reduced-session summer months, the new boiler is particularly adapatable for on-off loads, thus helping Bowling Green to stay within its efficient budget.

High economies are provided by all four boilers for present steam needs with plenty of stand-by capacity for future growth. Maximum steam generating capacity of three of the boilers is 40,000 lb per hr, the other 20,000, at operating pressure of 125 psi and design pressure of 200 psi.

Maximum capacity in small boiler room space is provided by B&W Integral Furnace Boilers as well as high fuel economy, and economical, fast steaming. Their quality has been proved in action in hundreds of installations, in industry and institutions throughout the nation.

Like all B&W installations, the ones at Bowling Green share the advantages made possible by B&W's national network of plants and engineers, which maintain the highest standards in design, manufacture, installation and service. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

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